

POPULAR Computing WEEKLY

40p

24-30 May 1984 Vol 3 No 21

New weekly QL page

BRITAIN'S BEST-SELLING MICRO WEEKLY

CLASSIFIEDS
START
HERE

VALHALLA

GLUG
GLUG

TITANIC

GIVE YOUR BBC MICRO SOME STICK!
Allows you to use joystick with most programs.

- Simple to use.
- Requires just one block of memory space.

An invaluable program — easy for beginners, scope for the experienced. Joystick utility — £5 inc (Disc-compatible) cheques to:

CLARES MICRO SUPPLIES
Dept. PCW, 98 Middlewich Road
Northwich, Cheshire
Tel: (06064) 8511

Computer Swap
01-437 4343

Free readers entries to buy or sell a computer.
Ring 01-437 4343 and give us the details.

SHARP MZ 80K 48K plus Quantum Hi-Res graphics. Large quantity of software plus manuals, books and listings. Ex. cond, quick sale preferred, any offer considered above. £250. 01-889 1090.

TI 994A COMPUTER and manual for sale. £55 ono. Tel: 01-472 3791.

★ **STAR** ★
Fruity on
Commodore 64
See page 10
GAME ★

News Desk

Music for your ears

CASIO has produced an interface to allow its Casiotone MT-200 electronic music keyboard to be connected to micros.

The Casio Interface PA-1 will connect the keyboard to any computer which has either a Centronics interface built-in — or can be connected to one.

The MT-200 is a 49-key four-octave unit which costs £129. It has eight pre-set voice types — piano, clarinet, strings, etc — and six rhythms.

Using the interface unit any micro — such as the Spectrum with a Centronics interface — can be used to store and play notes to the keyboard.

The keyboard is instructed from Basic with the sequence of notes to be played stored in the form of a Basic string.

continued on page 5

MSX invasion plans go ahead

PLANS for the invasion of the Japanese MSX computer are now sufficiently far advanced that the system has been formally unveiled to the press.

All of the major Japanese electronics companies have joined forces to produce micros with broadly the same hardware which will all run the same software — the so-called MSX design standard. Each of the machines uses a Z80 processor with a 32K ROM including Microsoft Basic and at least 8K RAM. All use the same TI video chip giving a 40 x 24 text display (256 x 192 graphics resolution) with 16 colours available. All use the same GI three-channel sound chip. Where a disc unit is available as an option it is Microsoft MS-DOS compatible.

MSX machines have been on sale in Japan since last October and the first MSX micros to appear in this country will go on sale at a "competitive price" in the early Autumn.

Micros from eight Japanese manufacturers — Sony, Sanyo, Toshiba, Teleton, JVC, Mitsubishi, Hitachi and Canon — are expected to be in the shops by Christmas, backed by retail chains like Boots and Laskeys. Two other manufacturers, Yamaha and National Panasonic — both which have been successful with MSX in Japan — have still to decide whether to tackle the UK market.

By the time the first machines go on sale in September, several hundred British software packages will have been written for MSX. Over ninety per cent of the material will be games software. Among the companies writing for MSX are: Psion, Quicksilver, Virgin, Melbourne House, Thorn EMI, Silversoft and Hewson. Other companies which have shown interest in

continued on page 5



This Week

- **Special Feature** Ray Berry looks at the history of the micro-processor on page 12. ● **Networking** David Lawrence surveys the equipment needed to get going. See page 19. ● **Spectrum** M Sheffield presents a pixel by pixel movement program on page 22. ● **QL** An introductory guide for owners — and aspiring owners — by John Cochrane on page 28. ● **New Releases** This week's software includes Sheep in Space from Llamasoft and Contract Bridge from Touchstone. Page 52.

The Team

Editor
Brandon Gore

News Editor
David Kelly

Reporter
Christina Erskine

Software Editor
Graham Taylor

Production Editor
Lynne Constable

Editorial Secretary
Cleo Cherry

Advertisement Manager
David Lake

Assistant Advertisement Manager
Alastair Macintosh

Advertisement Executive
Tom Watson

Classified Executive
Diane Davis

Advertising Production
Lucinda Lee

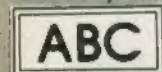
Administration
Theresa Lacy

Managing Editor
Duncan Scot

Publishing Director
Jenny Ireland

Popular Computing Weekly,
12-13 Little Newport Street,
London WC2R 3LD
Telephone: 01-437 4343
Telex: 296275

Published by Sunshine Publications Ltd.



Registered at
the Post Office
as a newspaper

MEMBER OF THE AUDIT
BUREAU OF CIRCULATIONS

ISSN 0265-0509
Typeset by The Artwork Group,
55-63 Goswell Road, London EC1,
in association with Ink on Paper Ltd.
Printed by East Midland Litho Printers
Ltd, Oundle Road, Woodston,
Peterborough PE2 9QR.

Distributed by S M Distribution
London SW9, 01-274 8611. Telex: 281643

© Sunshine Publications Ltd 1984

How to submit articles

Articles which are submitted for publication should not be more than 3,000 words long. The articles, and any accompanying programs, should be original. It is breaking the law of copyright to copy programs out of other magazines and submit them here — so please do not be tempted.

Accuracy

Popular Computing Weekly cannot accept any responsibility for any errors in programs we publish, although we will always try our best to make sure programs work.

This Week

News	5
Casio	
Letters	7
Copyright	
Star Game	10
Fruity for Commodore 64 by Lee Tanner	
Special Feature	
Microprocessors by Ray Berry	
Reviews	14
In-depth software analysis	
Networking	19
David Lawrence looks at the equipment needed to get started	
Spectrum	22
Pixel by pixel movement by M Sheffield	
QL	28
John Cochrane takes a user's-eye view of the QL	
Commodore 64	32
Resequencing text file by Adrian Warman	
Open Forum	35
Four pages of your programs	
Microradio	39
Ray Berry's column	
Arcade Avenue	40
Tony Kendle's arcade check-out	
Adventure	43
Tony Bridge's corner	
Peek and Poke	45
Your questions answered	
New releases	52
Latest software programs	
This week	54
Top 10 plus all this week's software	
Competitions	55
Ziggurat, Puzzle, Hackers	

Editorial

Networking is becoming increasingly popular. More and more micro owners are buying modems and linking themselves up to a range of free bulletin boards and commercial systems such as Prestel and Micronet 800.

Admittedly, the overall number of home networkers is still relatively small, but the total is growing all the time.

But, while networking is a comparatively new phenomenon for home micro users, it is not new to business users. A range of companies including Reuters, Datastream and Telerate, have been providing electronic news and market report services for years.

Now Merrill Lynch, a New York securities company, has joined forces with IBM to launch International Market Net — a firm designed to challenge existing network information providers.

There are also increasing attempts to attract micro users to home banking schemes such as Homelink, while Commodore has set up Compunet, a pilot network which could rival Micronet. WH Smith plans to launch its own Games Network in early 1984 (see PCW 26 April — 2 May).

Printers and disc drives are the two peripherals most commonly bought once a user has set up a basic system of micro, tv and tape recorder. Modems may soon become the third most sought-after item.

Next Thursday

Next week's star game is Air Sea Battle for 16/48K Spectrum by Gary Burrows — a strategy game in which you must protect your oil rigs.

Subscribe to Popular Computing Weekly

I would like to subscribe to *Popular Computing Weekly*
Please start my subscription from the

ISSUE

UK Addresses: ☐ 26 issues at £9.95 ☐ 52 issues at £19.95

Overseas Addresses: ☐ 26 issues at £18.70 ☐ 52 issues at £37.40

Please tick relevant box

I enclose my cheque to *Popular Computing Weekly* for

Name

Address

Please send this form, and cheque, to *Popular Computing Weekly*, Subscription Dept., 12-13 Little Newport Street, London WC2R 3LD.



IF ANDROID TWO MADE THE CRITICS RAVE, T.L.L. WILL GIVE THEM HYPERMANIA.

And why not?

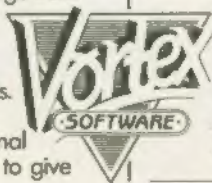
It has the finest graphics yet to emerge from
a Spectrum game.

Fly the latest swing-wing fighter
bomber, with full 360° control.

Seek out and destroy enemy targets.
Land, refuel, take off at will.

With 3D multi-screen, multi-directional
wraparound landscape, it's guaranteed to give
your brain hypermania.

Fly Tomado Low Level today – just one in a
series of mindblowing action games.



PLEASE RUSH ME

- | | | |
|--------------------------------------|------------------|--------------|
| <input type="checkbox"/> T.L.L. | SPECTRUM 48K | £5.95 |
| <input type="checkbox"/> ANDROID TWO | SPECTRUM 48K | £5.95 |
| <input type="checkbox"/> ANDROID ONE | SPECTRUM 16K/48K | £4.95 |

TOTAL VALUE **£**

Games suitable for keyboard and joystick

NAME

ADDRESS

(BLOCK LETTERS PLEASE)

Enclose PO/cheque payable to VORTEX SOFTWARE and send to
VORTEX SOFTWARE, 280 BROOKLANDS ROAD, MANCHESTER M20 9HD.

DEALER ENQUIRIES • CALL 061 973 9580

• VORTEX ACTION GAMES • AVAILABLE FROM ALL LEADING RETAILERS •

MSX

continued from page 1

MSX include Bug-byte, Bubble Bus, Kuma, Aligata, Micromega, Ocean and Ultimate.

The first MSX machines will



be previewed at the CETEX trade show at Earl's Court later this month.

The MSX standard is a controversial one. Several prominent software houses have expressed disappointment that the giant Japanese manufacturers have chosen to base their home computer standard on the now somewhat elderly Z80 processor. Commented Psion's David Potter at the MSX launch: "Any standard has advantages and disadvantages. MSX will provide a

common environment for software development and the consumer will benefit from the wide range of peripherals available for it.

"The disadvantage is that it could inhibit change. Innovation in the decade to come will be considerable and the ques-

tion remains whether the MSX is sufficiently and open-mindedly designed to allow it to become a standard for many years to come."

Microsoft Japan's Kay Nishi — the man who originally conceived the idea of the 8-bit MSX standard — admitted that no standard can last for ever. He said: "I don't deny that 16-bit is coming — but not this year, or in the next two years. Whatever happens, MSX will be upwardly compatible."

The micro can be used as a kind of sequencer building up note or rhythm patterns over which it is then possible to play a further melody using the Casio keyboard directly.

The PA-1 Centronics interface costs £29.50 and comes complete with a 48-page manual which includes a program listing for a Basic music editor.

Sinclair car underway

SINCLAIR Vehicles — the company set up in February this year by Sir Clive Sinclair to produce a range of battery driven cars — has abandoned its option to buy the former deLorean car plant in Northern Ireland.

Development of the first product — a low-cost town runabout — is now at an advanced stage and preproduction is scheduled to commence

Eight leave Commodore

EIGHT high level employees at Commodore International have left the company in the past three weeks and another 12 seem likely to go. Major staff changes were widely expected after Marshall Smith took over as president in January, after the surprise departure of Commodore's founder Jack Tramiel.

Commodore itself will not comment on whether the senior executives — four of them vice presidents — resigned or were fired.

The vice presidents who

have left are Bernhard Witter (finance), Greg Pratt (manufacturing and assembly), Taro Tokai (in charge of the Japan unit) and Lloyd Taylor (technology).

Also among those lost to the company are Jack Tramiel's son Sam, and John Feagans, director of software technology. The latter plans to start up a software company with another Tramiel son.

Marshall Smith commented that the departures were part of "internal restructuring" and that the organisation has been streamlined as a result.

3D adventure

CONTINUING its hallmark of 3D games, Hewson Consultants is presently working on a 3D adventure for the Spectrum.

The game will be entirely graphic with the main character, a wizard, being controlled and moved by use of a key-

Hares and hounds

THOSE who didn't know where to look for the golden hare in Kit William's *Masquerade* will have another chance when the computer game *Hare Raiser* is brought out.

When it was first published, the book *Masquerade* sparked off a national treasure hunt — it contained cryptic clues to lead the readers to a buried prize of a jewelled hare ornament.

Now the treasure hunt winner, Ken Thomas, has sold the hare he won to Jeff Pennell, who in turn has set up the company Haresoft to promote a computer game based on a new quest.

"*Hare Raiser* will be an adventure puzzle, sold in two parts," said Jeff.

under licence at the Hoover plant in South Wales later this year.

Production prototypes have already been constructed and are under test. Sinclair Vehicles hopes to launch the town car in the UK in the first quarter of 1985.



Programmer Steve Turner

board or joystick. The only text input will be to enlist the aid of other characters who will then appear on the screen.

"The finished game should contain about 255 locations, with up to 250 objects to pick up along the way," said Hewson programmer Steve Turner.

The game, as yet untitled, has a target date for completion of September 1.

"The first part will be available at the end of June and the second twelve weeks later. Both parts of the puzzle will be needed to complete it."

The first person to send in a correct solution — the name of a secret location — plus two registration numbers that come the game will have a choice of either the hare or £25,000 as a prize.

Hare Raiser will initially be available by mail order on the expanded Vic 20, Commodore 64, Dragon 32 and 64, Atmos, Spectrum and BBC micros. An Amstrad version is expected later. Each part of the game will cost £8.95.

Prism move

HAVING lost its exclusive right to distribute Sinclair products earlier in the year, Prism has now been appointed main distributor for Oric.

Casio

continued from page 1

The string is then executed by the keyboard with an LPrint command.

From Basic it is possible to set the pitch, duration and voice of any note and control the type of rhythm played by the keyboard. It is also possible to transmit multi-voice data and mix and transpose tunes.

Rallying round

ATARI is to convert its top-selling game *Pole Position* for the Spectrum, BBC and Commodore 64 computers.

The new titles should be available shortly and are priced at £14.99 for the Spectrum and BBC versions on cassette £24.99 for the Commodore 64 version on cartridge.

Gold plate contact keys are used,
guaranteed life of 10⁶ operations



It's easy to see why the FDS Keyboard is the best selling Spectrum keyboard in the world. This stylish, slim-line keyboard has been transforming Spectrums world-wide. The keyboard contains all the graphic characters of your ZX Spectrum, plus additional function keys. It has 4 cursor control keys, an auto rub-out key, a separate key for full stop and comma, a full length space bar, shift keys either side and 2 function keys for direct entry into green and red E modes. The FDS Keyboard has real individual contact switches and not a membrane like most other Spectrum keyboards on the market which are more expensive. The case is easily adapted to allow the microdrive to fit inside along with the power supply. Fixing is simplicity itself and no soldering or technical knowledge is required.

£49.95
+ £2.50 p&p

Keyboard buffer available allows Spectrum to be connected without dismantling **£8.75 + 80p p&p**

Transform your Spectrum now!



The Fuller Box can be bought separately for £29.95 and the Orator for £34.95 + 80p p&p

This is the ultimate games unit, containing not only the sound synthesiser from the Fuller Box but also the speech unit from the Fuller Orator.

It will probably be the only add-on you will need to buy after the Spectrum. We don't call this the Master Unit for nothing as it contains a Programmable Sound Generator, Joystick Controller, Beep Amplifier, Cassette Interface, Through Bus and 'Orator' Phoneme Voice Synthesiser plus a three-inch loud speaker and volume control.

Speech can be synthesised easily so that your micro can talk to you and play chords of music at the same time. Directly accessible in Basic it is able to say anything you command using the keyboard or a games program.

£49.95
+ £2.50 p&p

The FD42 keyboard is still a firm favourite when it comes to a low cost option for your ZX81 or Spectrum. It is now a "standard" to Sinclair users. Neatly presented in an attractive ABS plastic case it transforms the Sinclair computer into a useful professional unit, providing all the graphic characters of the ZX81 or Spectrum, with additional keys to aid the user. No technical knowledge is required for installation.

£29.95 + 80p p&p

SOUNDAMP - The SoundAmp. amplifies all the sound your Spectrum makes, it has a volume control and is easily fitted and comes in a sleek black box like the Master Unit to match your Spectrum. **£9.95** 80p p&p

RS232 PRINTERFACE - ROM based software. Versatile printer interface. Comes complete with instructions and lead. **£34.95** 80p p&p

CENTRONICS PRINTERFACE - As above but for parallel printer with CENTRONICS input. Lead can be supplied at £7.95. Further details upon request. **£39.95** 80p p&p

SOUNDSTICK - Sound amplifier and Kempston compatible joystick interface **£19.95** 80p p&p



See us at
YOUR COMPUTER FAIR
June 14-17 on
Stand 669

Fuller MICRO SYSTEMS

Fuller Micro Systems
The ZX Centre, 71 Dale Street,
Liverpool 2. Tel: 051-709 4666.

709 4666 - Mail Order
709 9280 - Tele Sales
709 9209 - Customer Services
236 4612 - Retail Sales

Send large stamped addressed envelope for the free complete Fuller hardware range catalogue. Kits available on most items - Prices on request

Please supply me with


I enclose a cheque payable to Fuller Micro Systems for £
or debit my credit card ☐ Barclaycard ☐ Access

Card No

Name

Address

Fuller Micro Systems, The ZX Centre
71 Dale Street, Liverpool 2. Tel: 051-236 6109



Fuller reserves the right to alter specifications of the equipment without prior notice

Letters

Still waiting

Some Microdrive and QL potential customers may be interested in the progress of Sinclair's other little wonder — the Flat Screen Pocket tv.

I placed my order when the set was first announced in October 1983 intending the tv as a Christmas present for my son. Having been previously a purchaser of ZX81/Printer/Spectrum/Microdrive — all when first announced — I should have known better.

On the 15th November I received a letter to acknowledge my order — a cheerful missive full of stock phrases like 'please rest assured' — 'no firm delivery date yet' — 'just as soon as' etc. and concluding with 'You'll hear from us again in January'.

However, the next letter came on 22nd December and apologised for the slow build-up of production which meant that they would not be able to deliver my tv until January and ended with — "please accept our Best Wishes for a Happy Christmas and prosperous 1984 — complete with pocket tv".

I next heard from Sinclair on 6th February this year when I received a form requesting payment as delivery was imminent. This I confirmed with a cheque by return of post and received an acknowledgement on 26th February which said I could expect delivery by the end of March.

The next letter was dated 29th March and informed me that production was still slow to build up and my tv would not be delivered until April. The good news was that my cheque had not yet been encashed which was small comfort as it had been a Building Society cheque which had of course been debited from my account on drawing.

On the 18th April I telephoned 0276 62111 to enquire when delivery was likely and a charming young lady assured me that my tv would be despatched by the end of the month. Today is May 2nd and as nothing has yet materialised I telephoned again only to be told by another and equally charming young lady that de-

spatch should be within 10 to 14 days.

Seven months wait is well in excess of the time it took to get either my Spectrum or Microdrive, but I am very patient and intend to keep on at them until I get my tv.

However, if it should turn out to be faulty I think I may take the trouble to drive down to Cambridge and insist that Uncle Clive eats it — in a sandwich with all those bloody letters!

Yours in hope,

John C. Priest
53 Gaskell Crescent
Thornton-Cleveleys
Blackpool, Lancashire

PS Would anyone care to hazard a guess on the waiting period for the battery driven car when it is announced?

Radiated interference

In PCW, May 3 your correspondent D. McRiner reported a 'strange anomaly' regarding the loading of tapes on his ZX Spectrum.

From his description, this would appear to be a straightforward case of electromagnetic interference (EMI). Nearly all electronic devices which incorporate circuitry for generating pulses (such as TV sets and computers) will generate EMI to a greater or lesser extent.

There are two ways in which this EMI can affect other equipment. One is via any

interconnecting cabling, eg, if one or more pieces of equipment are connected to the same power supply. This is known as conducted interference. The other way is 'through the air' so to speak. In other words the offending equipment radiates EMI which, under the right circumstances, can cause a voltage to be induced in a second piece of equipment which, in turn, can cause it to malfunction. This is known as radiated interference. This would seem to be the case with D. McRiner's experience.

While there is not, as far as I know, any legislation governing levels of EMI from television sets, both the USA and West Germany have published standards, enforceable in law, concerning EMI from computers. It is widely believed that the EEC will introduce legislation, possibly within the next year or so, which will force UK manufacturers to drastically reduce levels of EMI from computers and computerised equipment.

J. McQuillan
Flat 3
24 Priory Road
Great Malvern
Worce

Legal insurance

I wish to clarify a number of points in the article by Gail Counsell (PCW, May 10) concerning the service offered by The Software Registry.

It was stated that the legal expenses insurance excludes interlocutory (sic) actions. The precise exclusion is "ex parte legal proceedings". It was strongly implied that the insurance excludes actions in which defendants claim authorship of an allegedly infringing program. The precise exclusion is of disputes concerning "proprietaryship of the insured copyright". Insured-copyright is defined in the policy in terms of copyright subsisting in an item registered with the Software Registry. The obligation of a claimant to submit a legal opinion, to which Ms Counsell takes such exception, is a standard clause of legal expenses insurance and is

not unique to our policy.

The allegation that our brochure avoids saying that registration does not give any added legal protection as such is wholly incorrect. The brochure contains several very clearly worded statements to the effect that we are not granting legal rights but are attempting to maximise the benefits of current legislation. Other publications, including a leading national newspaper, have remarked upon the candid way in which our brochure deals with this and other points. Our documentation contains no inaccurate or misleading statements and potential clients are specifically requested to read all of the small print.

The Software Registry is a consortium of 32 practising intellectual property specialists. Prior to launch, our service was thoroughly vetted by further specialist lawyers including an eminent barrister experienced in software piracy litigation.

A number of software houses and computer industry organisations have publicly welcomed our initiative in establishing this service.

It is unrealistic to expect a solicitor to prepare and execute an Affidavit for less than £23 (including VAT) and the average cost of an interlocutory action is likely to be nearer £5,000 than £15,000, with some interlocutory actions costing significantly less. It is possible to arrange cover for Anton Pillar (sic) orders but the premium is many times our registration fee.

The value of our legal expenses insurance is that it provides confidence to initiate relatively inexpensive interlocutory proceedings with financial backing should one thereby become embroiled in a full trial where costs of £100,000 are all too possible.

Personally, I would not like to enter a software copyright legal battle armed only with an unopened registered envelope.

C M Sturt
Director

The Software Registry
60 Lincoln's Inn Fields
London WC2



"Is there a 'sell by' date on this standard?"

We've just won an award for blowing



away the cobwebs.

You know the story, the Micro you thought would give endless hours of fun soon becomes a five minute wonder. You get bored and dump it on the shelf to gather dust.

With the introduction of Micronet 800 you now have access to a vast mouth-watering menu of facts, figures and fun.

If we said it was a major breakthrough in microcomputer technology we wouldn't be going over the top.



Just recently at the Which Computer Show we picked up the prestigious RITA award for Systems Innovation of the Year.

RITA is the 'Oscar' of the computer industry. Judged and sponsored by the major forces in related institutes, associations and publications.

Incredibly all it costs is just a pound a week to take up a subscription to the Micronet system. Plus, for most of you, a local telephone call whenever you want to connect up.

Then you've got 30,000 pages at your fingertips, including Computer News Flashes, all that Prestel has to offer, and Micronet's SwapShop. Where you can buy anything from joysticks to second-hand computers.

Interact with our daily news update. You can even take over the world; competing against hundreds of other subscribers on the system, in our 'Starnet' game.

If we haven't won you over with that then try downloading our wide selection of free games and other tele-software.

Naturally, you can run household accounts, manage businesses, talk to other subscribers nationwide using the system.

The list is endless and so is the fun. The only addition you need to connect with Micronet 800 is a modem unit.

Apart from that all you'll want is a pen to fill in the coupon for more information. Then we'll have you linked up in no time.

Before the dust settles, in fact.

Please send me the full facts about Micronet 800.

Name _____

Make/Model of Micro _____

Address _____

Telephone _____

MICRONET 800, Scripco Court, 155 Farringdon Road, London EC1R 3AD.
Telephone 01-278 3143.

Page 8

micronet
800

MICRONET 800, Scripco Court, 155 Farringdon Road, London EC1R 3AD. Telephone 01-278 3143.

*Prestel and the Prestel symbol are trademarks of British Telecommunications.

Fruity

Stay healthy with a fruit eating game for the Commodore 64 from Lee Tanner (mind the mushrooms though — they're not so nice)

This is *fruity* for the Commodore 64 with Simons' Basic and joystick.

The game is set in an enchanted garden. You must control a spider to eat all the fruit which is scattered amongst the mushrooms.

Further Instructions on play are included in the program.

There are ten levels of Play — Level 10

the hardest. After each screen is completed the program automatically moves on to the next level, but you have the option to start at any level by using F1 before any new game starts.

Program Notes

10-69 Main loop to move spider.
50-59 Increment score.

90-93 Sound effect.
100-299 Set up variables and set level.
300-380 Next level.
400-470 Lose a life.
500-650 End game and ask for another.
1000-1050 Place mushrooms on screen.
1500-1550 Place fruit on screen.
2000-2090 Draw screen.
3000-4030 Title and set starting level.
5000-5370 Instructions.
10000-11000 Define graphics.

```

5 GOTO100
6
10 PROC MOVE
12 VOL 15 WAVE 1.00100000 ENVELOPE 1.0.0.0.0
14 PRINT AT(14,0);"F1=1 MUSIC 10;"D1000000" PLAY 1
15 P=INT(RND(1)*5)+70:IF(F=70)=4 THEN15
16 POKESP+500,F:POKECC+500,FC(F-70):EXEC BLIP
18 FORZ=1 TO F
20 JS=JOY:IF JS=0 THEN10
22 IF JS=1 THENND=84
24 IF JS=5 THENND=85
26 IF JS=3 THENND=86
28 IF JS=7 THENND=87
30 ND=M+(ND=84)*40-(ND=85)*40+(ND=87)*-(ND=86)
32 IFPEEK(SP+ND)=32 THENND=0
34 IFPEEK(SP+ND)=65 OR NOTPEEK(SP+ND)=F THENCALL DIE
36 IFPEEK(SP+ND)=F THENEXEC SCORE
40 POKESP+N,32:N=ND:POKESP+N,ND:POKECC+N,9:FORI=1 TO DE:NEXTI
42 IF(F=0)*4 AND(F=1)*4 AND(F=2)*4 AND(F=3)*4 AND(F=4)*4 THENCALL NEXT
44 B=5:PRINT AT(34,0);"B" B " " IFB=0 THENCALL DIE
46 NEXTZ:GOTO15
48
50 PROC SCORE
51 VOL 15 WAVE 1.00100000 ENVELOPE 1.0.0.15.0
52 MUSIC 1;"D1000000" PLAY 2
54 F=F-70:IF(F=70)=1 SC=SC+1:PRINT AT(22,0);"S" SC:IFBL=1 THEN58
55 IFSC=1000 THENFLASH S,13.2 MUSIC 1;"D1000000" PLAY 2

```



[illegible]

```

50000 PRINT:GOTO 10 TO THE LEVEL NUMBER + 10.:
50010 PRINT:MEG.. ON LEVEL 5 YOUR SCORE 50 POINTS
50020 PRINT:END OF EACH PIECE OF FRUIT YOU EAT."
50030 PRINT:END ALL THE TIME YOU ARE PLAYING A DRAWS
50040 PRINT:IF THE PIECE IS PENDING DOWN IF IT REACHES
50050 PRINT:KEEPS YOU LOSE A LIFE."
50060 PRINT:END YOU COMPLETE THE SCREEN BEFORE THE
50070 POINT:END AND POINT OUT IT IS ADDED TO YOUR
50080 PRINT:MEG..(USE, END)
50090 GOTO 10000 IF NOT 50000 PRINT
50100 POINT:END 13:1 PRINT:*****
50110 GOTO 10000
50120 PROC GRAPHICE
50130 MEH
50140 DESIGN 2 #E000+6400
50150 AB..P..P..
50160 AB..P..P..
50170 AB..P..P..
50180 AB..P..P..
50190 AB..P..P..
50200 AB..P..P..
50210 AB..P..P..
50220 AB..P..P..
50230 AB..P..P..
50240 AB..P..P..
50250 AB..P..P..
50260 AB..P..P..
50270 AB..P..P..
50280 AB..P..P..
50290 AB..P..P..
50300 AB..P..P..
50310 AB..P..P..
50320 AB..P..P..
50330 AB..P..P..
50340 AB..P..P..
50350 AB..P..P..
50360 AB..P..P..
50370 AB..P..P..
50380 AB..P..P..
50390 AB..P..P..
50400 AB..P..P..
50410 AB..P..P..
50420 AB..P..P..
50430 AB..P..P..
50440 AB..P..P..
50450 AB..P..P..
50460 AB..P..P..
50470 AB..P..P..
50480 AB..P..P..
50490 AB..P..P..
50500 AB..P..P..
50510 AB..P..P..
50520 AB..P..P..
50530 AB..P..P..
50540 AB..P..P..
50550 AB..P..P..
50560 AB..P..P..
50570 AB..P..P..
50580 AB..P..P..
50590 AB..P..P..
50600 AB..P..P..
50610 AB..P..P..
50620 AB..P..P..
50630 AB..P..P..
50640 AB..P..P..
50650 AB..P..P..
50660 AB..P..P..
50670 AB..P..P..
50680 AB..P..P..
50690 AB..P..P..
50700 AB..P..P..
50710 AB..P..P..
50720 AB..P..P..
50730 AB..P..P..
50740 AB..P..P..
50750 AB..P..P..
50760 AB..P..P..
50770 AB..P..P..
50780 AB..P..P..
50790 AB..P..P..
50800 AB..P..P..
50810 AB..P..P..
50820 AB..P..P..
50830 AB..P..P..
50840 AB..P..P..
50850 AB..P..P..
50860 AB..P..P..
50870 AB..P..P..
50880 AB..P..P..
50890 AB..P..P..
50900 AB..P..P..
50910 AB..P..P..
50920 AB..P..P..
50930 AB..P..P..
50940 AB..P..P..
50950 AB..P..P..
50960 AB..P..P..
50970 AB..P..P..
50980 AB..P..P..
50990 AB..P..P..
51000 END PROC

```


In the crystal ball

Ray Berry looks at microprocessors and their history

If ever you take a sneaky look inside a computer (and it may not be advisable if your computer is under guarantee), you will see one 'chip' that is usually much bigger than the rest — the microprocessor.

There are only about three or four different kinds of microprocessor in use of those different computers in your high street store. They can usually be recognised by the number written on the top. The most common is the Zilog Z80, which can be found inside Sinclair computers like the Spectrum and the ZX81. The Z80 can also be found in the Sharp machines, the Tandy machines and the good old Video Genie, to name but a few.

The other most common microprocessor is called the 6502 and this is in the BBC, the Electron, the Vic, the Onic/Atmos and the good old Pet. The Commodore 64 has a microprocessor called the 6510, which is very similar to the 6502. The odd man out is the Dragon, which has favoured the Motorola 6809 along with the Tandy Colour Computer.

Whatever micro you own, you can be sure that it has a microprocessor of some description. Without that microprocessor, we would not have a computer in our homes. In fact we would not have microcomputers as we know them at all.

So, where did these wonderful things come from? Well, back in the 1940s, the earliest of the electronic computers had processing units which consisted of thousands of glass valves, much like those in the old 'steam' radios. These computers weren't very reliable, in fact they broke down in a few hours. The heat from all the valves was enormous and extremely difficult to cope with. The first computer of this type was ENIAC which stands for Electronic Numerical Integrator And Computer. This monster was developed in America in 1946 and it consisted of 18,000 valves, was 60 feet by 25 feet and weighed something in the region of 30 tons.

Near the end of the 1940s, the transistor was invented. This led to what is now known as the second generation of computers — ENIAC being the first generation.

The second generation grew up in the 1950s and the early 1960s and consisted of hundreds of circuit boards which contained thousands of transistors, resistors, capacitors etc. In a circuit board about six inches square there was probably about 10 or 20 transistors and a hundred other components. There would have been several hundred to several thousand of these boards connected by wire — they usually filled several rooms.

Later in the 1960s, the new technology really started going places. The people who made the transistors developed a whole new technology. It became possible to put

several dozen transistors on a 'chip' of silicon and the integrated circuit was born. The computer generations seem to get a little intermingled here, but these early integrated circuits were used in what is called third generation computers.

It took a lot of these 'chips' to construct a board which could be called a computer, and it required a lot of other components such as resistors and capacitors to make up the required processing power. No single chip could be called a microprocessor, at least not as we know them.

In fact, it wasn't until 1971 when a company called Intel produced the first microprocessor. This microprocessor was based on a chip of silicon about a quarter of an inch square which carried 2250 transistors and all the necessary components and circuitry to be called a processing unit or microcomputer — its own right. The fourth generation was born.

These superchips are known as Large Scale Integration (LSI) microprocessors. By 1976, these chips could carry more than 20,000 components and they formed the basis of the fourth generation computers that we buy in the shops today.

The obvious question is 'What comes next?' What will the fifth generation consist of? To answer this, it is worth having a look at what we are trying to develop in 1984 and hope that that points the way. Much work is going on, both in this country and abroad, to develop better microprocessors.

This research takes various directions, one of which is to add other functions of the computer such as memory and communi-

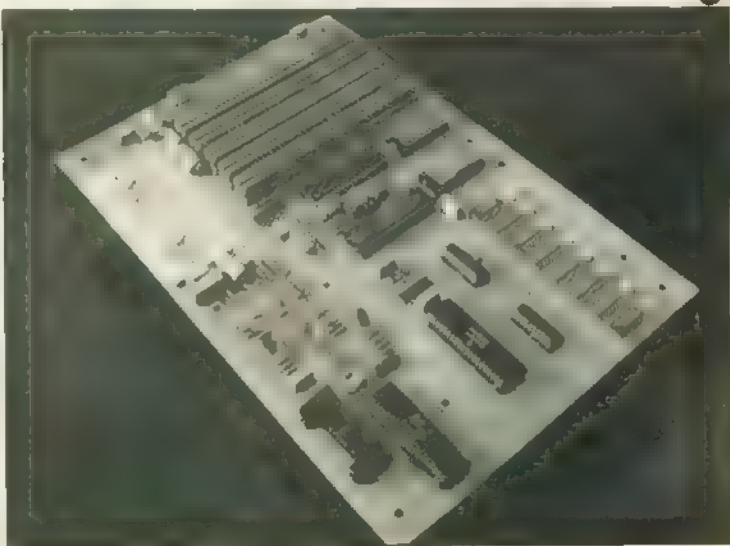
cations facilities to the microprocessor all in a single chip. One example of this is the British 'Transputer' developed by Inmos. The transputer is expected to cope with about ten million instructions per second and to be able to communicate with other transputers within the same machine, making an extremely powerful computer.

Another technical area of research is into the mass production of Gallium Arsenide (GaAs). This is a semiconductor material like silicon, but through which electrons can travel up to six times faster. GaAs is already used in some advanced transistors, but is difficult to produce in large quantity.

As for the actual fifth generation computers themselves, what will they be like? There is a project in this country known as the Alvey Programme, which was set up last year by a government committee headed by British Telecom's John Alvey. This programme, with the help of nearly £400 million from the government and British Industry, is looking into the future and researching new very large scale integrated circuits, artificial intelligence and new and innovative ways to write complex programs.

Similar work is being done in the United States, but nowhere is there a more expensive and well publicised fifth generation project than in Japan. It is a 10 year programme to develop computers that have knowledge and can mimic human thought processes. The Japanese project is expected to have cost a thousand million pounds by the year 1990.

It is difficult to look into the future. Probably impossible. I can remember reading an important scientific report on future technology that was published in the 1930s and they failed to predict jet aircraft, nuclear power and computers. I think I'll just put my crystal ball away.



Ingenious...



Computer games for people who hate computer games.

Give your joystick a rest, and your brain a chance
with these family favourites.

Machine code programs for the Commodore 64, and coming soon
for the Spectrum and BBC/B.

Software by...

**Leisure
Genius**



3 Montagu Row, London W1H 1AB

DISTRIBUTORS:

Ferranti & Craig. Telephone: 0722 330222

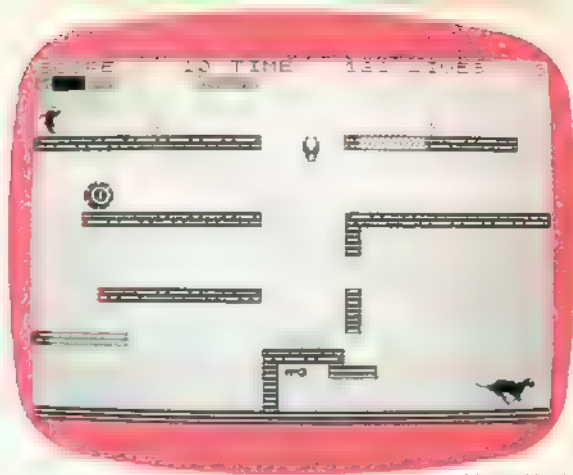
Websters Software. Telephone: 0483 62222

SCRABBLE® trade mark and copyright licensed by Scrabble Schutzrechte und Handels GmbH (a J.W. Spear & Sons PLC associated company)

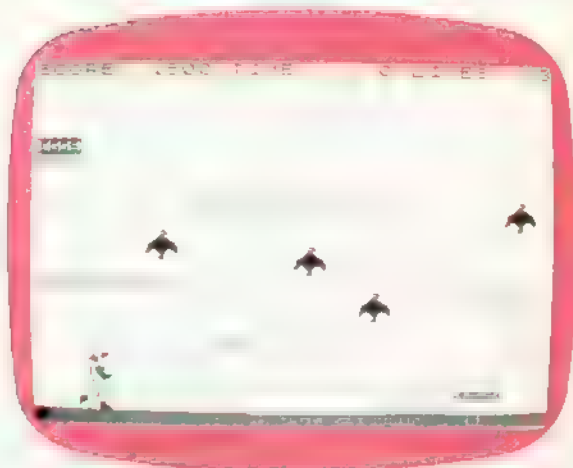
CLUEDO® trade mark and copyright licensed by Waddingtons Games Limited. MASTERMIND® trade mark and copyright licensed by Invicta Plastics Limited.

KENSINGTON™ trade mark and copyright licensed by Whale Toys Limited. LEISURE GENIUS® is a registered trade mark of Winchester Holdings Limited.

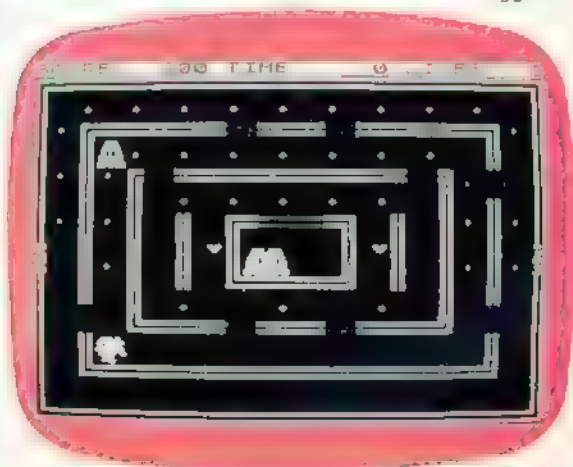
BEAT THIS AND WIN £3000



Manic Koala



Egg Pack



Ms Hortense

All games above were
designed and created
using 48K Spectrum
H.U.R.G.

MELBOURNE

The H.U.R.G. competition offers you over £3,000 of prizes for your game designs without the need of any programming knowledge! Only H.U.R.G. gives you the chance to earn royalties from programs based on your ideas — it's the easiest way to join the software revolution without having to learn how to program!

But you will have to hurry to win the £3,000 prize as the competition closes on April 30, 1984. It's so easy you owe it to yourself to enter your game ideas. Games will be judged on the basis of originality, graphics and playability. Further details are available with every copy of H.U.R.G.

Whether you want to share your game ideas with the world at large or just with your friends and family, H.U.R.G. is the game design program for you. At last, the games you imagine can be the games you play!

HIGH LEVEL — requires no programming skills — simply design the shapes you want, and H.U.R.G. will animate them into the most amazing on-screen action you've ever seen. Choose any setting for your game, from mazes to outer space or sinister caverns — the only limit is your imagination.

USER FRIENDLY — H.U.R.G. will lead you through a series of easy-to-follow procedures, ending in the creation of a game that is as wild as your imagination.

REAL TIME — You can see exactly what you're creating at all times. Every game has hundreds of variations, and you can change its features at any time. You can speed up the action, change the size of the characters and even make them more vicious — it's all up to you; and you can see it all on-screen immediately.

GAMES DESIGNER — H.U.R.G. enables you to design and store the games you create on cassette and play them later using H.U.R.G. as the control program. It's the one program you will never tire of.

Now you can create all the stunning arcade effects on your 48K Spectrum that up until now have only been available to professional software houses.

BY PUBLIC
DEMAND
COMPETITION
EXTENDED TO
JUNE 30, 1984

HOUSE

Orders to:
Melbourne House Publishers
131 Trafalgar Road
Greenwich, London SE10

Correspondence to:
Church Yard
Tring
Hertfordshire HP23 5LU

All Melbourne House cassette software is unconditionally guaranteed against malfunction.

Trade enquiries welcome.

☐ Please send me your free 52 page catalogue
Please send me

SPECTRUM

<input type="checkbox"/> Spectrum The Hobbit 48K	£14.95
<input type="checkbox"/> Spectrum Penetrator 48K	£5.95
<input type="checkbox"/> Temo-Dakti 40 48K	£6.95
<input type="checkbox"/> Melbourne Draw 48K	£8.95
<input type="checkbox"/> H.U.R.G. 48K	£14.95
<input type="checkbox"/> Abersoft Forth 48K	£14.95
<input type="checkbox"/> Spectrum Classic Adventure 48K	£6.95
<input type="checkbox"/> Spectrum Mugsy 48K	£6.95

COMMODORE 64

Software

<input type="checkbox"/> Commodore 64 The Hobbit	£14.95
<input type="checkbox"/> Commodore 64 Hungry Horace	£5.95
<input type="checkbox"/> Commodore 64 Horace Goes Skiing	£5.95
<input type="checkbox"/> ACOS+	£8.95
<input type="checkbox"/> Commodore 64 Classic Adventure	£6.95
<input type="checkbox"/> Commodore 64 Star Trooper	£6.95

VIC 20

<input type="checkbox"/> VIC Cosmonauts	£5.95
<input type="checkbox"/> The Wizard & Princess	£5.95

ORIC-1

<input type="checkbox"/> Oric-1/48K The Hobbit	£14.95
--	--------

BBC

<input type="checkbox"/> BBC Model B The Hobbit	£14.95
---	--------

All versions of The Hobbit are identical with regard to the adventure program. Due to memory limitations, BBC cassette version does not include graphics.

£
Please add 80p for post & pack £80

TOTAL £

I enclose my ☐ cheque ☐ money order for £

Please debit my Access card No


Expiry Date

Signature

Name

Address

Postcode

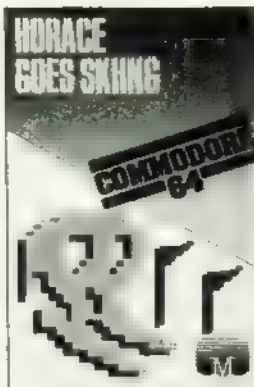
Access orders can be telephoned through on our 24-hour ansafone (01) 858 7397. 



Snow Go

Hungary Horace is a blue blob with arms and legs who first appeared in some games for the Sinclair Spectrum. *Horace Goes Skiing* was one of these, and it has now been converted to run on the Commodore 64. Before Horace actually makes it to the ski slope, he must hire some skis from the hut, on the far side of a busy road – a hazardous business, since the drivers at this ski resort will mow down any pedestrian who gets in their way. Once Horace has hired his skis, he has to cross over again to get the ski slope. In this second phase of the game Horace has to ski down a slalom course between pairs of flags, avoiding the trees which are dotted about the slopes.

The game can be played with either keyboard or joys-



tick, and full instructions are given on the cassette insert. The program loads very quickly (for a Commodore anyway) since it incorporates a high-speed loader program called *Payload*. This loads the game in about 2 minutes, as fast as the 1541 disk drive, it is claimed.

The graphics are quite

smoothly done, but are not exceptional – no better than the Spectrum original in fact. The sound is another matter though. During the game itself, it is OK, but no better than average. However, the catchy intro music is exceptionally good – probably the best music I have heard in a game for the 64.

Overall this is a well executed and entertaining program. However, there is not much variety and it and I found it quite quickly becoming repetitive.

Richard Corfield

Program *Horace Goes Skiing*
Price £5.95 **Micro** Commodore 64
Supplier Melbourne House, Church Yard, Tring, Herts, HP235LU.

Mere Human

Psytron for the spectrum comes in an exceptionally large box, with an exceptional-

ly large booklet of instructions to match. You are the Psyttron, 'less than human, far more than mere computer', your mission being to survive a six level attack on the Betula 5 Installation. The levels get more difficult and more complicated as you proceed through the game, and the last level, the 'final conflict', is so difficult that the publishers are giving a prize of a QL computer to the first person to complete it (though God knows where they think they will get it from!).

The graphics are superb – each location in the game has its own high resolution picture in full perspective. However, my main complaint with the game is that the controls are very complicated; each level has its own controls, and it is almost impossible to remember all of them. Whatever happened to left, right and fire?

This is a game for the sort of person who is prepared to sit up all night trying to master each level, and if you are persistent and can keep a cool head, I am sure that you will find it rewarding.

Simon Lane

Program *Psyttron* **Price** £9.95
Micro Spectrum **Supplier** Beyond Software, Durrant House, 8 Herbal Hill, London EC1 5JJ

In Jest

"The biggest appetite ever" is how *Slurpy* is described. However, don't be fooled into expecting a *Pac-Man* look-alike game, because this one is quite different. *Slurpy* is a green blob with an eye and a long snout, who floats about inside a cave along with various other creatures with such colourful names as Glowbug, Widow-maker, Cave Phantom, Creeper's Deathball and Evil Eye. Anything coming close to *Slurpy*'s snout is sucked in, accompanied by a very convincing sounding slurping noise. Unfortunately, some of these creatures are poisonous and must be spat out immediately or else you will lose one of your three lives. Some of them may actually attack *Slurpy* – this also loses you a life.

the stick to any sector fires jets on the space suit and moves your character to match. With the fire button released however the stick controls limb movements and allows you to punch and kick in any combination. The animation is cleverly realistic and once you get used to the control system it is very effective. There are keyboard options but frankly they are a poor alternative.

Unfortunately, the display is dull black and white with such small characters that you feel only a projection tv four feet wide would allow you to feel involved in the action. This game will not attract the bright lights, noises and sparkle brigade. For the experienced gamer it does offer a new type of challenge, intellectual as well as reactive. And as you survive longer so the space station spins faster and you have to re-learn trajectories. I fear this one may be too cerebral to attract the large sales it warrants.

Program *Free Fall* **Price** £9.95
Micro BBCB **Supplier** Acornsoft, 4a, Market Hill, Cambridge.

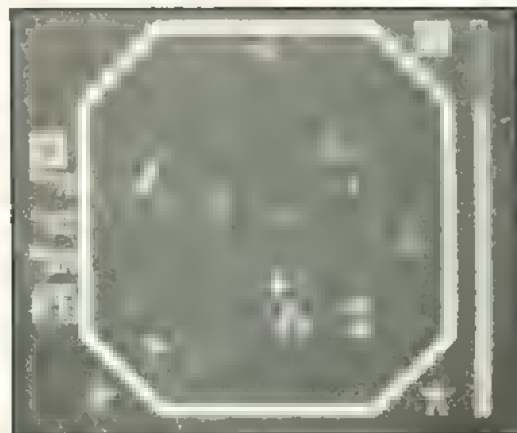
Dave Watterson

Drifting into Space

Ian Bell's *Freefall* is an arcade-style game for thinking people. The scenario has you as the sole survivor of an attack on a space station. In a space-suit, but unarmed, you have to face various nasty beasts. You can punch, ram and kick most of them into submission. If you are dexterous enough you can even catch one

of their bombs and sling it back at them. You cannot win (at least I'm not good enough to beat off the attackers for more than a few minutes) but the longer you fight the better. Your air supply will run out anyway, but faster if you are injured. In that wonderful fantasy logic of computer games you get extra lives the more points you accumulate.

The game makes a most intelligent use of joysticks. There are eight sectors visualised round the stick. With the fire button held down moving



Quite apart from the creatures, there are also occasional earthquakes which may cause stalactites from the roof of the cave to fall on you, and in some caves a kind of deadly red whirlwind is also found. If you survive all the problems in one cave and you slurp up all the creatures which are not poisonous then you move on to the next cave which is the same again but faster with more creatures.



The game can be played with either keyboard or joystick, and instructions are provided on the cassette insert and in the program. One or two players can take part and there are four levels of difficulty.

The graphics and sound are both fairly simple, but nevertheless they are effective. The graphics in particular are nicely done - there is often a lot going on in the cave. The game itself is good fun - the concept seems quite original and it is well executed.

Richard Corfield
Program Slurpy Price £7.95
Micro Commodore 64
Supplier Thorn EMI Computer Software, 296 Farnborough Road, Farnborough, Hants.

Microdrive

Trans-Express will, says Romantic Robot, transfer your cassette-based software to Microdrive. Note, they do not claim all your software - they admit that not all will go across, and then only some 60% can be expected to run.

After loading Trans-Express a short menu appears, offering the option of Microdrive to

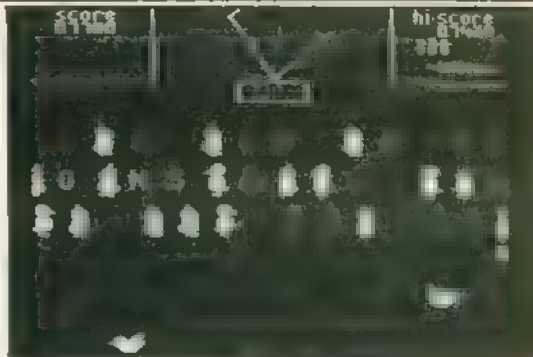
Microdrive, Tape to Microdrive and Instructions (the instructions, when encountered, go on about a facility called Supertrans, which apparently will deal with extra-large programs, but I couldn't find this facility). The user will want to see the instructions first - these consist of several on-screen pages of explanation which can be printed as desired. Romantic Robot supplies no other documentation, and says that all the instructions are clear, and prompts are given from within the program. This is true, but still, I would have liked a manual.

A Basic program will be loaded in two parts; the header first and then the main bulk of the program. Machine coded tapes are loaded in a similar manner, although many of the commercial tapes available nowadays consist of several blocks of code, each of which is handled separately by Trans-Express.

Cataloguing the cartridge when it is done shows your program all present and correct. Now comes the good bit - running the thing! Romantic Robot's claim that Trans-Express will transfer your cassette-based software to cartridge is quite correct. However, not many of them will run without some modification. *Manic Miner* will, but *Jet Set Willy* won't. Neither will *The Hobbit*, nor any of the other long adventures for which the Microdrive would seem so suited. What of more serious software? *Microsphere's Omnicalc*, about the best spreadsheet for the Spectrum, wouldn't run (although there is, I believe, a version now available on cartridge), and *VU-File* will anyway only *Save* to cassette, so the exercise seemed a bit pointless to even attempt.

So, Trans-Express fulfils the claims made for it, but only the user experienced in machine-code disassembling and re-assembling would make full use of it (and they would surely have written their own routine!).

Program Trans Express Price £9.95
Micro Spectrum 16/48K
Supplier Romantic Robot, 113, Melrose Avenue, London NW2.



Shot Away

Carousel, written by David Shepherd, is a superbly animated version of the fairground shooting gallery. Your task is to shoot down rows of ducks, rabbits, owls and letters which parade in three ranks above you. Though the characters appear to trot their movement is very like the endless loop transporting mechanical models in a carnival booth. There is also a spoked wheel spinning above the ranks which you have to shoot. Clear all the targets and a

polar bear appears on screen for you to pot shot if you can - he reverses direction and speeds up with every hit - I never got more than two on him. There is also the obligatory fairground organ playing.

So far, so good - an excellent, colourful, game.

The snag is that it is soon very boring. This is very much a game for juniors who will quickly learn to time their shots and run up pleasingly high scores.

Dave Watterson
Program Carousel Price £9.95
Micro BBC B
Supplier Acornsoft, 4a Market Hill, Cambridge.

Pole Apart

If you enjoy the arcade game *Pole Position*, then you will probably enjoy *3D Speed Duel* - a similar type of game for the Commodore 64. In this you race your car versus another controlled by the AI around a twisting circuit.

Either keyboard or joystick can be used and full instructions are provided on screen. The difficulty of the game can be varied considerably - you can choose the difficulty of the circuit (5 levels of twistiness), the speed of the other car (5 speeds), and the number of laps to complete (from 1 to 5).

The graphics are fairly simple but effective. Perspective is used to create an impression of driving around a circuit which disappears into the distance, and the sky and horizon scroll horizontally as you steer your car, giving an apparently changing viewpoint.

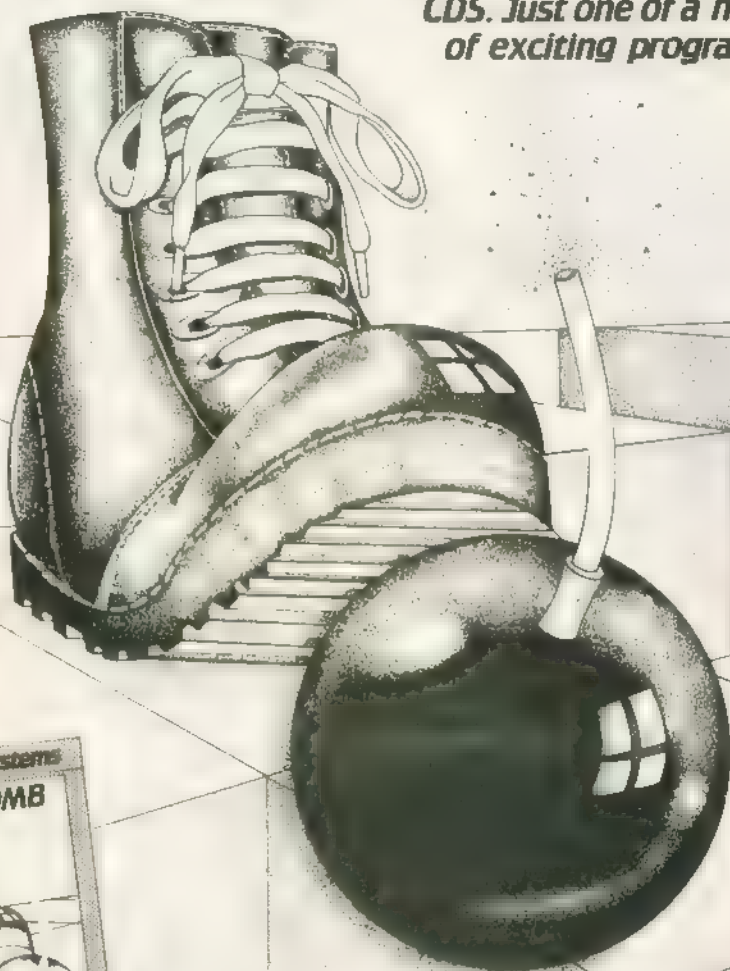
The use of sound is a bit disappointing, although you can tell how fast you are travelling from the pitch of your engine noise, which is useful. However, the other car seems to be powered by some kind of silent propulsion system. Also when you crash the simple graphics and sound combine to make the effect a little unspectacular.

By tuning the playing options just about everyone should be able to select a game which is difficult enough to be challenging but not so difficult that it becomes frustrating. However, it may eventually pall because the variety provided by the hazards normally found in other racing games (eg, oil slicks) does not occur in this one. Nevertheless it provides plenty of good straightforward fun.

Richard Corfield
Program 3D Speed Duel
Supplier DK Tronics, Unit 6, Shirehall Industrial Estate, Saffron Walden, Essex. CB11 3AQ.

The CDS experience, more action...more adventure....

*This is Timebomb a brand new
Arcade Adventure game from
CDS. Just one of a new range
of exciting programs....*



Currah μ Speech compatible

SPECTRUM 16/48K £5.95



CDS Micro Systems

ONLY £5.95 each at W.H. Smiths, Boots, John Menzies and other leading Computer Stores, or... direct from CDS Micro Systems
Send Cheque or P.O. To CDS 10, Westfield Close, Tickhill, Doncaster DN11 9LA. Tel: (0302) 744129. (Trade enquiries welcome)

© Inducted 1989, 1991

Bits and pieces

David Lawrence takes a look at what you need to start networking

In the first article in this series we took a brief look at some of the things that people were actually doing with micros in the field of networking.

Basically, to communicate with other micros over a telephone line you need five things:

- 1) A micro which can output to a port.
- 2) A modem to translate the output of the micro into a form capable of being sent down a telephone line.
- 3) A program to deal with incoming and outgoing information.
- 4) Some money.
- 5) A telephone, preferably using the new format plug sockets.

Exactly which equipment you will need will depend upon which micro you start with and who you want to communicate with. The variety of modems and software being used is bewildering. The easiest area to get into is communicating with Prestel. Micro-net is a service directly aimed at micro users on Prestel and they can supply equipment which will allow owners of most of the popular machines to get started. To communicate with bulletin boards and other micro users, you will have to put together your own package.

1) The Micro

Just about every popular micro on the market is now being used for communication in one way or another, though it would take pages to go through the bewildering variety of commercial and amateur packages on offer for each.

If you are buying a new machine, then it is only fair to point out that by far the most popular for this kind of application seems to be the BBC Micro, for which there is a mass of software and hardware available at reasonable prices. The only sensible advice for other machines is to approach the people who sell or make modems and ask them whether they know of any way their equipment can be adapted to your machine.

2) Modems

The best micros for networking are those which can output material according to a standard known as RS232. This basically lays down the way in which the on/off pattern of bits which represent the material to be transmitted can be translated into changes in voltage levels along a wire. Not all micros can actually output RS232 unaided, though most can usually have an add-on tacked onto a port to translate their output.

Once RS232 can be obtained from two micros, it should normally be possible to make them communicate, provided that you have the software to do it. What they

will not do, however, is to communicate down the phone line. Feeding varying voltage levels into the telephone system is not only illegal, it is pretty pointless, since the whole of the system is designed to stop them.

In order to communicate via a telephone, it is necessary to translate the output of the micro into audio tones which the telephone network will accept and transmit. This task is called "modulation" — translating back into RS232 is called, unsurprisingly, "demodulation". The piece of equipment which generates sound which is fed into the telephone handset, and those which generate an acceptable telephone signal which can be fed directly down the line. The first type, "acoustic" modems, can normally be used with any sort of telephone. All that is required is to connect the modem to the micro and to rest the telephone in a special cradle containing a small loudspeaker and microphone which will "talk" down the phone in much the same way as you would.

Modems which connect directly into the phone line are normally more reliable in use, but they can usually only be used with phones fitted with the new system of easily removable spare plastic phone jacks which allow phones to be plugged and unplugged with ease. They are supplied with a two-way plug, so that both the phone and the modem are plugged into the same socket. Such modems require British Telecom approval (often slow in coming) before it is legal to use them, though there is nothing illegal in selling modems which have not been granted this approval.

This is a very difficult area. I have a modem which is approved by BT, called the

"Buzzbox" by Dacom. At the same time, a very high proportion of communication goes on using unapproved modems.

The most popular modem with bulletin board users at the present is called the Minor Miracles WS2000, which costs around £120 and will deal with just about all of the different formats for communicating that you are likely to need, including bulletin boards, Prestel type systems and the American Bell system. This particular modem is the only one I have seen seriously discussed over the past couple of months. But, it has to be pointed out that the WS2000 has not yet been approved by British Telecom and if you use such a modem you are liable to be fined if BT descend on your house and demand to examine your equipment.

3) Software

Unless you know what you are doing, there is no point in spending large sums of money on equipment without an absolute assurance that there is software available to turn your micro into a terminal for communication. In some cases, this software will come built into the micro, but none of the most popular machines have it.

A micro and modem without the software to make them work together are quite useless. There is plenty of amateur and commercial software around, but it is wise to make sure that you can get hold of some first.

4) Money

Just a reminder, whose importance you will not realize until you receive your first phone bill after taking up networking. Unless you are careful in the use of your new equipment, it will eat up money at an alarming rate. Do keep a track of how much time you are using, it could save you from a very nasty shock.

Any networker who would like to contribute ideas, routines, etc. to this page, please write to PCW at 12-13 Little Newport Street, London WC2R 3LD.

Useful Addresses

Minor Miracles, PO Box 48, Ipswich 1, IP4 2AB,
Tel. 0473 58384 (Modems)

Tandata Marketing, Albert Road North, Malvern,
Worce., WR14 2TL (Modems)

Dacom, 16 Alston Drive, Bradwell Abbey,
Milton Keynes, MK13 9HA, Tel. 0908 311885

Micronet 800, Scriptor Court, 155 Farringdon Rd,
London, EC1R 3AD, Tel. 01 278 3143 (Complete
Prestel service)

dgh

10 North Street
Ashford
Kent

Ashford (0233) 25897
(0233) 32597
Telex 965451

software centre

Serious software for home or business use . . . We offer an impressive range of useful software, fun software and educational software for most popular computers, plus a wide selection of hardware

Name	Producer	Price Cassette	Price Disk	Name	Producer	Price Cassette	Price Disk	Name	Producer	Price Cassette	Price Disk
BBC				EASYSPELL	CBM	—	£28.00	SPECTRUM			
BEEBCALC	Gemini	£19.95	£23.95	EASYSPELL (USA version)	CBM	—	£47.95	CASH BOOK & FINAL ACCOUNT	Gemini	—	£26.00
BEEBLOT	Gemini	£19.95	—	EASTOCK	CBM	—	£75.00	CASH CONTROLLER	Richard Shepherd	—	£3.95
BUSINESS ACCOUNTS	Diamondsoft	£14.95	—	FUTURE FINANCE	CBM	—	£75.00	DATABASE	Gemini	—	£18.00
BUSINESS GAMES	Acornsoft	£3.95	—	HOME OFFICE	Autogenic	14.95	—	D F M DATABASE	Dialog	—	£14.00
CASH BOOK & ACCOUNTS	Gemini	—	£26.00	INVENTORY 64	Comp S-W Assoc	—	£29.95	EASILEDDER	Gemini	—	£18.00
DATABASE	Gemini	£19.95	£23.95	INVOICING	Dialog	£2.95	—	HOME ACCOUNTS	Gemini	—	£18.00
DATABASE	SFA	£2.95	—	INVOSTAT	Bubble Bus	£.95	—	HOME BUDGET	Flowchart	—	£5.75
DATAMANAGER	SFA	£23.00	—	LABEL PRINTER	Autogenic	—	£28.95	I C S	Gemini	—	£18.00
DESK DIARY	Acornsoft	£3.95	—	MAGPIE	Mosac	£.95	—	MAIL LIST	Gemini	—	£18.00
DFM DATABASE	Dialog	£22.95	£23.95	MY SECRET FILE	Batteries Inc	—	£28.00	MULTI-FUNCTION CASH CONTROL	Richard Shepherd	—	£3.95
DFM DATABASE & LABELS	Dialog	£29.95	£28.95	PAPERCLIP	Bubble Bus	£.95	—	MY SECRET FILE	Mosac	—	£3.95
EASILEDDER	Gemini	£19.95	£23.95	POSTER PRINTER	Comp S-W Assoc	£8.00	£44.00	OMNICALC	Microsphere	—	£3.95
FLEXI-FILE	Diamondsoft	£3.95	—	PRACTICALC	Comp S-W Assoc	—	£44.00	PERSONAL FINANCE	D & Tronics	—	£3.95
HOME ACCOUNTS	Dialog	£14.95	—	PRAYTIME	Software For All	£23.00	£34.00	PROFILE	McGraw Hill	—	£3.95
HOME ACCOUNTS	Diamondsoft	£3.95	—	PURCHASE LEDGER	Software For All	£23.00	£34.00	PURCHASE LEDGER	Kemp	—	£14.95
HOME ACCOUNTS	Gemini	£18.00	£23.95	SALES LEDGER	Microsphere	—	£18.00	SALES LEDGER	Kemp	—	£14.95
HOME FINANCE	BBC Software	—	—	SIMPLEX III	Handic	£8.95	—	SMALL BUSINESS ACC	Pison	—	£12.00
INVOICING	SFA	£22.00	£24.00	STAT III (Rom Cartidge)	Software For All	£23.00	£34.00	SPECPLT	Gemini	—	£18.00
INVOSTAT	Dialog	£28.95	£29.95	STOCK CONTROL	Precision	—	£28.95	STOCKBOOK	A Persons	—	£3.95
INVOSTAT	Gemini	£19.95	£23.95	SUPERBASE 64	English Software	£.95	—	STOCK CONTROL	Kemp	—	£18.00
MAILIST	Gemini	£18.00	£23.95	SUPERFONT 40	Mindata	£.95	—	TASWORD	Tasman	—	£12.00
MEMBERSHIP MANAGER	Acornsoft	£3.95	—	TAXMAN III	Centresoftware	14.95	£14.95	VU CALC	Pison	—	£3.95
NUMBER BALANCE	Acornsoft	£3.95	—	TEXTPRO	Dialog	£3.95	—	VU FILE	Pison	—	£3.95
PURCHASE LEDGER	SFA	£23.00	£24.00	TRANSACTION	Via	—	£28.00	WORD PROCESSOR	Quickshin	—	£3.95
RECORD KEEPER	BBC Software	£13.75	—	VIZAWRITE & VISASPELL	Via	—	£79.00				
SALES LEDGER	SFA	£22.00	£24.00	VIZAWRITE ONLY	Autogenic	£5.95	—				
SIMPLEX BBC	Microsphere	—	£18.00	WORDCRAFT							
STOCK CONTROL	SFA	£22.00	£24.00								
TAX CALC	BBC Software	£17.25	—								
VU CALC	Pison	£14.00	—								
VU FILE	Pison	£14.00	—								
VU TYPE/TYPING TUTOR	BBC Software	£12.00	—								
WORDSWORTH	Ian Copalaka	£17.25	£21.95								
WORDSWORTH UTILITIES	Ian Copalaka	—	£26.95								
COMMODORE 64											
ADVERTISER	Bubble Bus	£5.95	—								
BUSICALC 1	Supersoft	£44.95	—								
CALC RESULT 64											
ADVANCED	Handic	—	£38.00								
DATABASE	Gemini	£19.95	£23.95								
DATAPRO	Centresoftware	£14.95	£14.95								
DELPHI'S ORACLE											
DATABASE	Batteries Inc	—	£28.00								
DFM DATABASE	Dialog	£22.95	£23.95								
DFM DATABASE & LABELS	Dialog	£29.95	£28.95								
EASYSOFT	CBM	—	£75.00								

dgh software centre
opening May 26th

Prices correct at time of press.
All items subject to availability.

CREDIT CARD ORDER LINE

Ashford (0233) 32597



**Cut out and
keep
this advert**

A division of T Denne & Sons Ltd

AGF

**PRICE
BREAKTHROUGH**

EXCLUSIVE

MAIL ORDER

SPECIAL OFFER



9.95

AGF Joystick Interface II for Spectrum or ZX81

Now the AGF Interface II is even better value. Since we pioneered the cursor key interface in October 1987 there are now over 100 games or utility programs with either the AGF option or cursor key controlled. That makes it irreplaceable at this new low price.

Still incorporating the all important rear expansion connector which means other peripherals can be connected at the same time (ie. Ram Paks, Printers, Speech Units etc) and of course the key replication principle used guarantees this will never conflict electrically with any other add-ons.

When you feel like upgrading to a more flexible joystick system you can claim 12.5% off the purchase price of our Programmable Interface.

All AGF joystick interfaces will work with any industry standard joystick using 8 pin D-sub - including QuickShot II and the new Trackball controllers.

Don't settle for less. 110000 AGF

Joysticks

The QuickShot is great. The standard QuickShot is excellent value incorporating built-in built for sure-footed precision and a comfortably contoured trigger with a convenient top firing button plus conventional buttons on the base.

Four lines (plus 1 termination) in the industry standard 8 pin D plug for compatibility with our interfaces or direct connection to a Spectrum or home computer.

The new QuickShot II has an angled styling with a trigger type firing button as well as the top firing action and a broader base for greater button stability. The wind lock switch which allows a continuous stream of fire. It works normally a button press is required for each shot is located in the base for easy access in use.

Control length and termination as the standard QuickShot controller.

8.95



QuickShot

QuickShot II

11.95



12.5% discount off our Programmable Interface - valid 1 year on orders over £18

PLUS free m/c arcade game with 1st 100 orders Spectrum only

**so...
post free both ways**

Please allow up to 28 days from receipt of your order although we normally dispatch from stock within 7 days. All AGF products are guaranteed for 12 months and are supplied on a 14 day money back guarantee. AGF Hardware, Bodog Road, West Sussex. Telephone: 02431 823337.

FROM MR MRS MISS

ADDRESS

ENCLOSE A CHEQUE POSTAL ORDER PAYABLE TO AGF HARDWARE OR £
SEND NO STAMP NEEDED TO: AGF HARDWARE, DEPT PW,
FREEPOST BODOG ROAD, WEST SUSSEX PO22 9BB

QTY	ITEM	ITEM PRICE	TOTAL
	AGF JOYSTICK INTERFACE II	9.95	
	QUICKSHOT JOYSTICK	8.95	
	QUICKSHOT II JOYSTICK	11.95	
ONE	DISCOUNT VOUCHER IF ORDER EXCEEDS £18	FREE	
Z&B1	Z&B SPECTRUM	People's	FINAL TOTAL

One step, two step

M Sheffield presents a simple machine code program for pixel movement by pixel movement

Here is a small machine code routine that will move all the characters on the screen either 1 pixel to the right or 1 pixel to the left. Initially, the basic program in Fig 1 should be entered and run.

Let $x = \text{Usr } 65280$ will move the whole screen 1 resolution to the right. Let $x = \text{Usr } 65310$ will move the whole screen 1

resolution to the left. This program can be 'newed' and the *Usr* functions will still operate. To save the m/code routine on tape for later use, enter:

SAVE "move" CODE 65280,60 To load from tape on power-up of computer, enter: CLEAR 65279: LOAD "move" CODE

The *Usr* functions will now operate and

can be called from either the command mode or from within a program. For full effect, the *USR* functions should be contained within a *For/Next* loop. To prevent unwanted characters appearing on the opposite side of the screen, the right hand edge should be 'zapped out' prior to moving to the right and the left hand edge prior to moving to the left.

An example is given in Fig. 2.

It may be of interest to you to know that the machine code program was assembled using an editor/assembler on a model 1 TRS-80 computer. A copy of the assembled listing is shown in Fig. 3.

Fig 1

```
10 CLEAR 65279
20 FOR N = 65280 TO 65329
30 READ A
40 POKE A,A
50 NEXT N
60 DATA 35:108:20:11:20:0:0:119:40:1:218
70 DATA 33:108:00:00:00:00:0:11:4:35:1:00
80 DATA 35:108:11:4:40:11:120:177:32:238:201
90 DATA 33:0:64:11:6:20:109:119:35:1:110
100 DATA 20:1:6:00:00:00:1:0:1:4:40:200
110 DATA 108:0:1:1:2:35:1:1:170:177:32:238:201
```

Fig 2

```
5 REMARK 1: DRAW A, LINE 1
10 PRINT AT 100:1;"Left/right move"
15 PRINT AT 100:1:INSTR 1;"GRAPHIC 33"
20 CIRCLE 100:120:20: CIRCLE 100:65:40
30 FOR N = 1 TO 40
40 PLOT 0:1:50: DRAW INVERSE 100:1:50:118 "Zap out" left edge
50 LET A = USR 65280: REM Move left
60 NEXT N
70 FOR N = 1 TO 40
80 PLOT 255:0:100: DRAW INVERSE 100:1:50:118 "Zap out" right edge
90 LET A = USR 65310: REM Move right
100 NEXT N
```

FF00		00100	ORG	0FF00H
FF00	21A057	00110	START	LD HL,57A0H
FF03	7E	00120		LD A,(HL)
FF04	CB3F	00130		SRL A
FF06	77	00140		LD (HL),A
FF07	2B	00150		DEC HL
FF08	010817	00160		LD BC,6104
FF0B	7E	00170	LOOP	LD A,(HL)
FF0C	CB3F	00180		SRL A
FF0E	3802	00190		JR C,SETC
FF10	1804	00200		JR CONT
FF12	23	00210	SETC	INC HL
FF13	CBFE	00220		SET 7,(HL)
FF15	2B	00230		DEC HL
FF16	77	00240	CONT	LD (HL),A
FF17	2B	00250		DEC HL
FF18	0B	00260		DEC BC
FF19	78	00270		LD A,B
FF1A	B1	00280		OR C
FF1B	20EE	00290		JR NZ,LOOP
FF1D	C9	00300		RET
FF1E	210040	00310	MOVE1	LD HL,163B4
FF21	7E	00320		LD A,(HL)
FF22	CB27	00330		SLA A
FF24	77	00340		LD (HL),A
FF25	23	00350		INC HL
FF26	010817	00360		LD BC,6104
FF29	7E	00370	LOOP2	LD A,(HL)
FF2A	CB27	00380		SLA A
FF2C	3802	00390		JR C,SETC2
FF2E	1804	00400		JR CONT2
FF30	2B	00410	SETC2	DEC HL
FF31	C8C6	00420		SET 0,(HL)
FF33	23	00430		INC HL
FF34	77	00440	CONT2	LD (HL),A
FF35	23	00450		INC HL
FF36	0B	00460		DEC BC
FF37	78	00470		LD A,B
FF38	B1	00480		OR C
FF39	20EE	00490		JR NZ,LOOP2
FF3B	C9	00500		RET
FF00		00510	END	START
00000	TOTAL ERRORS			

Fig 3

CONT	FF16	00240	00200
CONT2	FF34	00440	00400
LOOP	FF0B	00170	00290
LOOP2	FF29	00370	00490
MOVE1	FF1E	00310	
SETC	FF12	00210	00190
SETC2	FF30	00410	00390
START	FF00	00110	00510

commodore

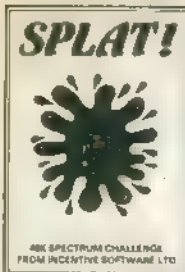
Z Z Z

Normal rate	Disc Drive	With Ripspeed
11 min 20 sec	1 min 40 sec	80 sec



MICRO CENTRE
1756 PERSHORE ROAD
COTTERIDGE
BIRMINGHAM
Tel: 021-458 4564

48K SPECTRUM £5.50
COMMODORE £5.50



48K SPECTRUM £5.50



48K SPECTRUM £5.50
BBC MODEL B £5.50



48K SPECTRUM £5.50



48K SPECTRUM £5.50



AVAILABLE FROM LEADING DEALERS EVERYWHERE

OR DIRECT FROM
Incentive Software Ltd, 54 London St,
Reading RG1 4SQ (0734) 591678


commodore 64

BEACH-HEAD

CASSETTE VERSION £9 DISC VERSION £12

Available post free from:
MILES BETTER SOFTWARE
221 CANNOCK ROAD
CHADSMOOR
CANNOCK, STAFFS
(05435) 3877

Specialist for all versions of TOP 64 SOFTWARE

THE

RUN
IS HERE

FOR 48K SPECTRUM & COMMODORE 64

LOOK
EX-DEMONSTRATOR'S
AND PARTLY USED

BBC B's from £199.98
COMMODORE 64's from £105.00
SINCLAIR 16K ZX from £49.50
SINCLAIR 48K ZX from £60.00

OTHER MODELS AVAILABLE

PRICES INCLUDE P&P + VAT

WE PAY TOP PRICES FOR CLEAN COMPUTERS

For further information:
BRITSALES, TAO HOUSE
9 TAVISTOCK ROAD, LONDON E18
Telephone 989 2705
MAIL ORDER ONLY

SPECTRUM 16/48K MACHINE CODE FOR BEGINNERS

This program, together with the free accompanying book, will enable the ABSOLUTE BEGINNER to easily understand the principles of machine-code programming.

The program simulates a microprocessor and features an extremely high quality display illustrating registers, flags, stack, program counter, memory and output. The book introduces instructions with short teaching programs which are typed in and then run. You then watch the program running as slowly as you wish. The book and program together will help you to make a successful start in understanding machine code programming and you will be in an excellent position to begin further study with a standard text book and full assembler. PRICE £7.95

"Machine Code for Beginners" is available from larger branches of Boots and good computer shops. You may also order direct from us by sending a cheque, P.O. or your Access number. Access orders may be placed by phone.

Please send "MACHINE CODE FOR BEGINNERS" Cost £7.95
Name P&P .50
Address Total £8.45

Access Number (if applicable)

ANNE SINCLAIR MAIL ORDER

	Our Price inc VAT		Our Price inc VAT
ZX81 (16K)		Star Fighter	6.99
Flight Simulator NEW!	4.95	Moneybox (H. Finance) NEW!	0.99
Krazy Kong	3.50		
Kongs Revenge	3.50	VIC 20	
48er	5.50	Snooker (3K)	7.99
Black Crystal	8.99	Arcadia	4.90
Sea Wolf	3.50	Sargon Chess II (Rom)	8.90
		Cosmic Commando (16K)	5.50
SPECTRUM		Frogm	4.95
Zig Zag (48K) NEW!	5.25	Cosmic Jailbreak (Rom)	8.90
Blue Thunder	4.99	Golf (Rom)	8.90
Pssst	4.99	JetPac (8K)	4.90
Trans Am	4.99		
Atic Alak	4.99	COMMODORE 64	
Codenamed Mat	5.99	Le Mans (Rom)	8.99
Flight Simulation (48K)	6.95	Sea Wolf (Rom)	8.99
Master Chess	5.95	Falcon Patrol	5.99
Bugaboo The Flea	5.90	Hunchback	5.99
		Twin Kingdom Valley	8.50
BBC MODEL 'B'		Alley Cat	6.95
Chuckie Egg	0.99	Purple Turtles	6.99
Hunchback	6.50	Siren City	5.99
Hobbit	11.50	Moby Dick	6.90
747 Flight Simulation	7.99		
Twin Kingdom Valley	7.99	ELECTRON	
Cylon Attack	6.99	Snapper	0.25
Snooker	7.99	Monsters	0.25
Castle of Riddles	8.95	Chess	0.25
		Pharaohs	0.99
DRAGON 32/64		Kamakazi	6.99
Flight Simulator	6.99	Dare Devil Dennis	6.99
Jump Jet	6.99	Roman Empire	6.99

SOFTWARE FOR ORIC, COLOUR GENIE, VIDEO GENIE, ATARI, MEMOTECH
ALSO STOCKED

OVER 700 TITLES STOCKED

Add 35p p&p for games and £4 insured Carriage for Computers and send
Cheque/PO or SAE for full lists (State requirement) to:

ANNE SINCLAIR MAIL ORDER

6 FARM WAY, NORTHWOOD, MIDDLESEX

JLC DATA DUPLICATION

CASSETTES — DISCS — EPROMS

- ★ 7 YEARS DATA EXPERIENCE ★
- ★ HIGH LEVEL OF SECURITY ★
- ★ NORMALLY NO MASTERING FEE ★
- ★ NORMALLY 7-10 DAY TURNAROUND ★
- ★ 24 HOUR TURNAROUND SUPERFAST SERVICE IF REQUIRED ★

Cassette Duplication — for most micros.

Disc Duplication — 35, 40, 80 track S/S, D/S, S/D, D/D.

Eprom Duplication — most types.

All data verified.

Blank Cassettes, Discs, Eproms — bulk sales only.

Blank Labels — most colours — bulk sales only.

Labels in sheets or rolls.

★ NEW SERVICE ★

Letter-heads and forms in rolls or fanfold for computer printing.

Telephone: (0226) 87707 24 hours
7 days a week

Enquiries and accounts to:

**JLC DATA, 49 CASTLE STREET, BARNSELY,
SOUTH YORKSHIRE S70 1NT**

In the interests of security, callers without appointments or proof of company status will not be seen.

A Penny For Your Thoughts

Actually MicroQuest offers you rather more than a penny.

£1,000 to be precise, if you can come up with an idea for an innovative and original use of microelectronics.

MicroQuest is organised jointly by Williams & Glyn's Bank and MAP, the Department of Trade and Industry's programme to encourage the application of microelectronics. The competition aims to encourage young people to take an active part in the development of British industry and business.

WHO CAN ENTER?

MicroQuest is open to everyone between the ages of 16 and 21, and is divided into two categories. The first is a general category allowing entries from anyone between 16 and 21, and the second dealing with those over 16 in secondary education.

We require entrants to MicroQuest, submit a 2,500 word report, identifying a new use for microelectronics and explaining how it could be implemented.

The applications can be literally for anything from musical instruments to control systems for mining machinery. The idea of the competition is to produce applications that will improve and develop original products or processes. It is important, however, that you keep in mind that the applications must be practical and

therefore realistic in terms of cost.

The report itself should give you a clear description of the area where you see the application being made, and what will be the benefits of the application. If you wish to illustrate your report, make sure that all your designs/illustrations are on A4 paper and that there are no more than 6 of them. When you send in your report it should include a summary of about 300 words of its contents.

The prizes for the general category will be a first prize of £1,000, with runners-up receiving prizes of £500 and £250. The schools category will have a first prize for the winner's school of £500 of computer equipment of its own choice, plus a cash prize of £150 for the winner. The runners-up will receive £100 and £50.

HOW TO ENTER

Simply tear off and complete the attached entry form and submit it with your report, which should also include a 300 word summary and any designs you have produced. The completed application form should be signed by your employer, teacher or supervisor.

Send the completed form to: "MicroQuest", Williams & Glyn's Bank, 20 Birchin Lane, London EC3

But hurry. Entries for the competition close on the 30th June 1984.

MICROQUEST APPLICATION FORM

Complete this form, which should be signed by a representative of your employers' company, or your training officer or teacher, and send it with your report and a 300 word summary,

to:
"MicroQuest",
Williams & Glyn's Bank,
20 Birchin Lane, London EC3

BLOCK CAPITALS PLEASE

NAME OF APPLICANT

AGE

DATE OF BIRTH

ADDRESS

NAME OF COMPANY/COLLEGE

NATURE OF COMPANY BUSINESS (if applicable)

SIGNATURE OF ENTRANT

I, the undersigned, confirm that this application is supported by (Name of Company or Training Supervisor).

SIGNATURE

POSITION IN COMPANY/COLLEGE



TURBO CHARGE YOUR SPECTRUM



Outperforms any Spectrum interface

The unique Turbo interface from Ram gives you all these features – and more – in one unit:

- * A variety of interfaces including: Rom cartridges, two 9-way \square plugs for standard joysticks, PLUS full expansion bus at rear.
- * Compatible with Kempston and Protek protocols.
- * Works with latest Quickshot Mk II auto rapid-fire joysticks!
- * Choice of Rom cartridge or tape cassette software.
- * Instant program loading with cartridge software.
- * Built-in power safety device – unique to Ram Turbo.
- * Full one year guarantee.
- * Immediate availability – 24 Hr despatch on receipt of P.O./credit card details (cheques – seven days).
- * Incredible value – only £22.95.

So don't wait around – simply complete the coupon and send it to us today.

Or call our credit card hot line on 02514 25252. (Access and Visa welcome).

Ram Electronics (Fleet) Ltd, 106 Fleet Road, Fleet, Hampshire GU13 8PA.

Please send me:

_____ Spectrum Turbo Interface(s) at £22.95
+ £1 p+p (overseas orders £3 p+p)

_____ Quickshot II Joystick(s) at £9.95
(Only when purchased with Turbo – normally £12.95 + £1 p+p)

I enclose cheque/postal order or charge my Access/Visa for: £ _____



Name _____

Address _____

Tel _____

To: Ram Electronics (Fleet) Ltd, 106 Fleet Road, Fleet, Hampshire GU13 8PA.

24 Hr
despatch for
credit cards and
postal orders



Trade and export enquiries welcome.

Key to the QL

John Cochrane kicks off a new page for QL owners with first impressions and a look at the SuperBasic Rom

My first impression of the QL was that it looked just like the photos. Not surprising perhaps but it left me a little at a loss for what to do next.

Without an up-to-date manual I felt a bit hamstrung, so one of the first things I did was to peek through the Rom to find the keywords available. This proved to be very useful and I have listed most of them below. This list will continue next week.

SuperBasic is by no means complete yet, and may well change as time goes by — this is presumably why no manuals were sent out with the machines. However, it seems unlikely that major revisions will be made at this late stage so the list given below should not prove too unreliable. The program which I used to obtain the commands is as follows:

```
100 BAUD 9600
110 OPEN #5:"SERIAL"
120 FOR N=15050 TO 15352,17161 TO 17216,19980
    TO 20050,
26980 TO 27950,32210 TO 32240,34276 TO 34450
130 M=PEEK(N)
140 SELECT M=32 TO 128:PRINT #5:CHR$(M)
150 END FOR N
160 STOP
```

Notice that I am showing off by using the very useful extended versions of *For*, the short version of *Select*, and the SuperBasic terminator *End For N*. The program would work perfectly happily with conventional Basic statements, but I enjoy exercising new-found programming skills. The number ranges in Line 120 refer to blocks of Rom which I had previously noted as containing things of interest, such as error messages and commands, by listing through the whole Rom to screen. Lines 100 and 110 set up RS-232C Port 1 for output to the printer at a baud rate of 9600. Watch out for Channel 5, however; I used it almost continuously for output to the printer but I think that it is usually used for the sound channel. You can use another number. Line 140 restricts print-out to those characters which may be of interest, ignoring unprintable characters.

The end result of this is a somewhat jumbled listing of words and miscellaneous

characters. The list below gives my interpretation of that listing. I have left out those "words" which appear most unlikely and have marked those which I am most unsure of. I have guessed the function of many of the keywords so watch out for changes.

ABS (a) — Returns absolute value of *a*
ARC (x,y,a,b,c) — Draws a part of a circle. I couldn't deduce what the last three parameters did.
ARC_R — A version of *ARC* using relative co-ordinates?
AUTO n,m — Allows automatic generation of line numbers from Line *n* in steps of *m*.
BAUD n — Sets baud rate *n* for use with serial ports.
BECOMES n — Sets baud rate *n* for use with serial ports.
BECOMES — Looks interesting but I couldn't get it to do anything.
BEEP a,b,c,d,e,f,g,h — Sound. Can leave off most of the parameters for simple sounds.
BEEPING — Don't know. Tests to see if sound still being generated?

BLOCK n,x,y,w,h — Fill block in window *n* defined by width and height at *x,y*.
BOOT MDV1:BOOT — Load and run program *BOOT* from Microdrive 1.
BORDER n,w,s — Sets up a border around window *n* of width *w*, colour determined by *s*.
CALL n — Calls a machine code subroutine at memory location *n*.
CHR\$(n) — Gives the string with code *n*.
CIRCLE x,y,r — Draws a circle at centre *x,y* of radius *r*. May allow additional parameters *e,a* for eccentricity (0 to 1) at an angle *a*.
CIRCLE_R — Similar to *CIRCLE* but using relative co-ordinates?
CLEAR n — Clears the variable space. It accepts *n* but I don't know what it does.
CLOSE #n — closes channel *n*.
CLS n — Clears window *n*.
CODE (a\$) — Gives the Ascii code of the first character of *a\$*.
CONTINUE — Resumes program running after break.
COPY a TO b — Copies a named set of data from one channel to another.
COPY_N — Don't know.
COS (a) — Trig.
ACOS (a) — Trig.
COT (a) — Trig.
ACOT (a) — Trig.

CSIZE w,h — Sets display character height and width. I couldn't get this to work.
CURSOR n,x,y — Re-positions the print location in window *n*.
DATE — Gives stored date and time. Rumoured to be for the chop.
DATES — ?
ADATE — ?
SDATE d,m,y,h,m,s — Resets internal clock.
DATA — Used to store variables/data within a program (See *Read*).
DAY\$(n) — Returns a day of the week corresponding to *n*.
DEFINE FUNCTION, DEFINE PROCEDURE — Start of SuperBasic function or procedure.
DEG — Converts radians to degrees?
DELETE — Used for deleting files on a Microdrive cartridge.
DIM — For dimensioning arrays.
DIR "MDV1:" — Lists the files on Microdrive *n*.
DIV — Integer divide. (I'm suspicious that integers are not implemented fully, if at all. I didn't have time to check).
DLIN — Deletes program lines. Can delete single lines or blocks of lines.
EDIT n — Fetches line *n* for editing.
ELLIPSE x,y,r — May have more parameters, seems to work as *CIRCLE*.
ELLIPSE_R — Relative co-ords?
ELSE — Used in long form of *IF*.
END FOR, END DEFINE, END SELECT — Used as a terminator.
EOF — Used to send end of file marker to a given channel?
ERROR — Probably not implemented yet, usually would expect this to be used with *On Error Goto*, etc.
EXEC — To load a sequence of programs and run them in parallel.
EXEC_W — As *EXEC* but waits for 1st program to finish before returning to the command level.
SEXECs — Used to save *Exec* to Microdrive?
EXIT — To exit a program construct such as a *Repeat* loop.
EXP (n) — Exponential.
FILL — Presumably fills a shape with colour. I couldn't get any response.
FILL\$ — ?
FLASH — Causes colour flashing at low-resolution mode.
FOR n v — Sets up start of loop with variable *n* taking values defined by the remainder of the line. These can be single values separated by commas and/or a range of values to be stepped through.
FORMAT — For setting up blank Microdrive cartridges for the storage of programs and data.
GOTO n — Transfer to line *n* of a program (I'm owed on by SuperBasic).
GOSUB n — Start subroutine at line *n*.
HRESPR — If this is a command I don't know what it may do. I was hoping that it might allow a high-resolution copy of a window to be sent to a printer but I couldn't get it to do this.
INK n — Sets foreground colour.
INKEY\$ — Returns the character last pressed at the keyboard (or from some other channel). Watch out for this one, the keyboard works through a buffer and *INKEY\$* gets data from the buffer. Thus if several keys are pressed between *INKEY\$* the value returned will be the first key pressed and so on until the buffer is empty, not the current key being pressed (See *Keyrow*).
INT (n) — Truncates *n* to leave an integer.
INSTREN — Not at all sure if this is a valid keyword.
INPUT — Allows input of data from a specified channel or the keyboard.
KEYROW (n) — The keyboard is set up as "rows" of eight keys, this command returns a number indicating the keys pressed in row *n*. Does not work through the buffer and so is useful for real-time applications.
LBYES — Load machine-code from microdrive?
LEN (a\$) — Length of a string.
LET — Start of a Basic assignment (optional).
LINE x,y TO x,y — Draws a line from one point to another.
LINE_R — A relative version of *Line*?
LIST — Lists program lines.

continued next week

COMPUTER LANGUAGES...



Imagine a ferret in a hardware shop

Not something you'd forget. That's how the Linkword System helps you remember that the Spanish for "hardware shop" is "ferreteria".

You'll remember that the French for "fish" is "poisson" by imagining poisoning your pet fish.

Using Linkword you'll learn over 350 words in only 10 hours, that's a quarter of the time it would normally take. Enough for holidays, business trips abroad or help with homework. Start from scratch, and it's amazing how quickly you learn a basic grammar and vocabulary.

Linkword courses in French, German and Spanish are now available from Silversoft for the 48K Spectrum home computer, and there are more to come soon.

They're the biggest thing in languages since the Tower of Babel.

To Silversoft Ltd, London House, 271/273 King St, London W6 9LZ. Tel: 01-748 4125

Please send me ... French German Spanish Linkword courses
at £12.95 each plus 50p P&P.

I enclose a cheque/PO for £ ... payable to Silversoft Ltd,
or please debit my Access card

No

Name

Address

Postcode

**SILVER
SOFT**

ANIROG



PETCH

Petch

The wonder penguin is engaged in a desperate search for diamonds hidden in a maze of ice cubes, harassed and chased by his arch-enemies Snowball and Snowbox. His chances of survival are slim. Six levels of skill with two player option.

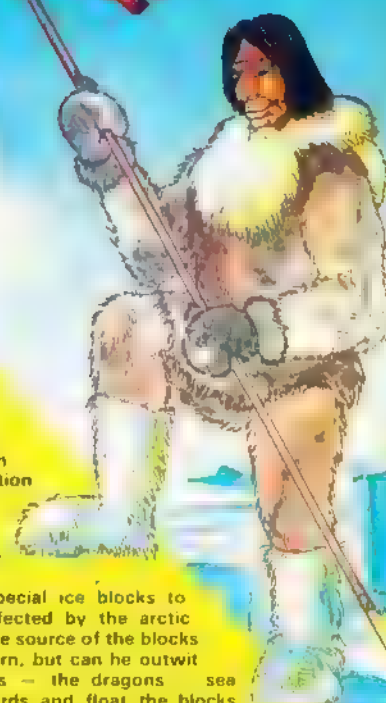
**3 NEW
TURBO 64
GAMES
£6.95
EACH**

House of Usher

Dare you enter the House of Usher. Behind each locked door of this nine room mansion a different style of arcade action awaits you.

Ice Hunter

Ice hunter needs special ice blocks to build an igloo unaffected by the arctic sun. He has found the source of the blocks in a multi level cavern, but can he outwit the grim inhabitants — the dragons, sea lions and vicious birds and float the blocks down the river to construct his dream home. Six levels and two player option.



ICE HUNTER

Also available on Disk at £9.95

TRADE ENQUIRIES: ANIROG SOFTWARE LTD. 29 WEST HILL DARTFORD KENT (0322) 92513-8
MAIL ORDER ■ HIGH STREET HORLEY SURREY 24 HOUR CREDIT CARD SALES HORLEY (02934) 6083
PAYMENT BY CHEQUE P.O. ACCESS VISA 50p POSTAGE ■ PACKAGING £2.00 OVERSEAS

Filed in sequence

Adrian Warman demonstrates a utility program that will resequence a Basic text file

Many of the commercial Assembler programs on the market (such as the excellent 'Mikro' cartridge) work in a fashion whereby they treat the source code (ie, the machine-code mnemonics) entered by the programmer as a form of Basic program. In other words, each instruction has a line number, and a corresponding program statement on that line. (Naturally, such source codes cannot be run in the normal fashion!)

During the course of using such programs, I have often found that I wish to insert additional lines in between the source instructions already present. Even when using the excellent principle of having lines with increments of 10 between each consecutive line, the addition of extra lines of source code mean that the gaps often become impossibly small, ultimately requiring a 'manual resequencing' to give more space. (Why not put more instructions on to the same line? Because it makes already difficult code even harder to read and understand.)

The primary purpose of this routine is to provide a utility program that will resequence an entire Basic text file for you. This is equivalent to 'renumbering' a Basic program, but note that *Goto's* and *Gasub's* are not altered! The utility provided (referred to as *RESEQ* from now on) is called by jumping directly into machine code supplies the following two pieces of information:

- 1) The first line number to be used in the text file.
- 2) The 'step' between each subsequent line.

Thus, an example of using *RESEQ* would be:

```
SYS 49152,1000,20
```

This will cause the *RESEQ* program to replace the old line numbers with the sequence:

```
1000.
1010.
1020.
1040.
```

... and so on.

Note that in the listings provided, the 'step size' between lines is restricted to the range 1 to 255, although modification is extremely easy to achieve.

Two listings are provided, one is the Assembly listing, which is referred to in the following program description, and the other is a Basic loader program.

Note that the program is completely relocatable. At present (using the supplied Basic loader), the program will be stored from location 49152. To alter this value to (say) the cassette buffer, change line 1040

of the Basic loader to read:

```
1040 ADDRESS=828
```

Be careful when doing this that the program will not be overwritten in the course of using the machine. For example, if you move the program to the cassette buffer, and then use the cassette in any way, the program would be corrupted, almost certainly producing a 'crash' when next used.

Program Notes

(Please refer to the assembly listing while following the program description.)

The whole key to the program resides in the fact that the user must be able to transfer information to the *rq* routine. This information consists of the new number for the first line in the file, and the increment between line numbers in the subsequent lines.

1130-1150 These three lines perform a simple but vital task. Upon entry to the routine (after the *SYS* command), there will be a system variable which is pointing to the first character after the *sys* address. Thus, in this case, the pointer is pointing to a comma character. Line 1130 checks to ensure that the comma is present. This is a Rom routine, with the advantage that if a comma is not found, a syntax error message will be produced automatically. Line 1140 searches for, and evaluates, any expression following the comma just located using line 1130. This is a very powerful Rom routine, in that any expression can be used, including variables or constants. The result of the evaluation is left in an area of system variables called 'Floating Point Accumulator 1'. Any illegal character in the expression will cause a suitable system error message. Line 1150 uses a Rom routine that converts the value in the F.P. Accumulator 1 into a 2-byte integer. If the number will not fit, an error message will be produced. Upon returning from this routine, A has the high byte, and Y has the low byte.

1160-1190 The integer value in A and Y represents the line number to be given to the first line in the

text file. Line numbers cannot exceed 63999, so a check is made to see if the line number is too large (lines 1160-1170). If the value is too big, then a jump is made to artificially force an error message. If the line number is valid, then it is stored in two unused zero-page locations, \$FB and \$FC.

1230-1320 These lines search for, validate and store the increment between lines. Lines 1230-1240 release a location in zero page by preserving its value on the stack. Lines 1250-1270 search for the increment number, which must follow a comma character. Note that these lines are identical to lines 1130-1150. Lines 1280-1290 ensure that the increment is not larger than 255. Lines 1300-1320 ensure that the increments are not zero, and then store the valid increment in zero page location \$14.

1360-1390 These lines store the address in memory of the start of the first line in the Basic text area. Usually, this is \$0601 (which is assumed to be the case here); alternatively, the address can be found from the vector stored at \$2B and \$2C — 'Start of Basic'.

1480-1500 These lines check to see if there is indeed a line in which to change the line number. If there is no line, then the CBM Operating System places two 0's where the line number would be expected. Using the vector at \$FD and \$FE, a check is made to see if these bytes are both zero, if so, then the job is completed. Note that this check is performed before attempting to assign the new line number, to prevent a non-existent line being created.

1550-1600 The old line number is replaced by the new line number (which is the value stored in \$FB and \$FC).

1640-1700 The next line number is calculated by adding the increment (stored at \$14) to the old line number that has just been used. The Operating System also includes, within each line of text, a pointer to the start address of the next line in memory. This value is retrieved from the current line, and placed in \$FD and \$FE, thus moving the vector to the next line.

1850-1860 Go around and check to see if this is the end of the program file.

1900-1920 If (in lines 1460-1500) no next line was found, the computer jumps to these instructions. The value which was in location \$14 had been placed onto the start for storage, so it is now restored, and a return made back to Basic.

1980 If any illegal value is entered for the line number, or for the line increment, a jump is made to this instruction, which jumps directly into the Basic Roms, to give an error message, and then return to Basic.

```

1000 REM BASIC LOADER          ENDER PROGRAM.
1010 :
1020 REM BY A. WARMAN
1030 :
1040 ADDRESS=49152
1050 SUB=0
1060 :
1070 FOR LOC=ADDRESS TO ADDRESS+100
1080 READ DATUM
1090 POKE LOC,DATUM
1100 SUB=SUB+DATUM
1110 NEXT LOC
1120 :
1130 IF SUB>14991 THEN PRINT "SUB ERROR."
1140 STOP
1150 :
1160 DATA 32,253,179, 32,138,173, 32,247
1170 DATA 183,201,230,176, 85,132,251,133
1180 DATA 252,162, 20, 72, 32,253,174, 37
1190 DATA 138,175, 52,247,183,201, 0,208
1200 DATA 43,192, 0,240, 41,132, 20,149
1210 DATA 1,133,253,149, 8,133,254,160
1220 DATA 0,177,253,200,17,253,240, 38
1230 DATA 200,162,251,145,253,200,165,252
1240 DATA 145,253,145,251, 24,101, 20,133
1250 DATA 251,165,252,105, 0,133,252,134
1260 DATA 136,177,253,170,136,177,253,133
1270 DATA 253,134,254, 24,144,209,104,133
1280 DATA 20, 96, 76, 72,170

```

Commodore 64

```

1000 033C      : RESEQUENCER PROGRAM.
1010 033C      :
1020 033C      : ACTIVATE BY 'SYS 49132,X,Y',
1030 033C      : WHERE X=START LINE NUMBER, AND
1040 033C      : Y=STEP BETWEEN LINES.
1050 033C      :
1060 033C      : IDENTIFY START OF PROGRAM.
1070 033C      :
1080 C000      : SC000
1090 C000      :
1100 C000      : CALCULATE AND PRESERVE START LINE
1110 C000      : NUMBER.
1120 C000      :
1130 C000 20FDAE START      JSR $AEFD
1140 C003 20BAAD          JSR $ADBA
1150 C006 20F7B7          JSR $B7F7
1160 C009 C9FA           CMP $9FA
1170 C00B B055           BCC BADVAL
1180 C00D B4FB           STY $FB
1190 C00F B5FC           STA $FC
1200 C011      :
1210 C011      : CALCULATE AND FIND STEP NUMBER.
1220 C011      :
1230 C011 A514           LDA $14
1240 C013 4B           PHA
1250 C014 20FDAE          JSR $AEFD
1260 C017 20BAAD          JSR $ADBA
1270 C01A 20F7B7          JSR $B7F7
1280 C01D C900           CMP $900
1290 C01F D041           BNE BADVAL
1300 C021 C000           CPY $000
1310 C023 F03D           BEQ BADVAL
1320 C025 B414           STY $14
1330 C027      :
1340 C027      : FIND START OF BASIC TEXT.
1350 C027      :
1360 C027 A901           LDA $901
1370 C029 B5FD           STA $FD
1380 C02B A90B           LDA $90B
1390 C02D B5FE           STA $FE
1400 C02F      :
1410 C02F      :
1420 C02F      : MAIN LOOP OF LINE RESEQUENCE.
1430 C02F      :
1440 C02F      : FIRST TEST FOR END OF TEXT.
1450 C02F      :
1460 C02F A000 LOOP      LDY $000
1470 C031 B1FD           LDA ($FD),Y
1480 C033 CB           INY

1490 C034 11FD           ORA ($FD),Y
1500 C036 F026           BEQ EXIT
1510 C038      :
1520 C038      : NOT END OF TEXT, SO CHANGE THIS
1530 C038      : LINE NUMBER.
1540 C038      :
1550 C038 CB           INY
1560 C039 A5FB           LDA $FB
1570 C03B 91FD           STA ($FD),Y
1580 C03D CB           INY
1590 C03E A5FC           LDA $FC
1600 C040 91FD           STA ($FD),Y
1610 C042      :
1620 C042      : CALCULATE NEXT LINE.
1630 C042      :
1640 C042 A5FB           LDA $FB
1650 C044 1B           CLC
1660 C045 6514           ADC $14
1670 C047 B5FB           STA $FB
1680 C049 A5FC           LDA $FC
1690 C04B 6900           ADC $900
1700 C04D B5FC           STA $FC
1710 C04F      :
1720 C04F      : FIND START OF NEXT TEXT LINE.
1730 C04F      :
1740 C04F 8B           DEY
1750 C050 8B           DEY
1760 C051 B1FD           LDA ($FD),Y
1770 C053 AA           TAX
1780 C054 8B           DEY
1790 C055 B1FD           LDA ($FD),Y
1800 C057 B5FD           STA $FD
1810 C059 B6FE           STX $FE
1820 C05B      :
1830 C05B      : GO AND MODIFY THE NEXT LINE.
1840 C05B      :
1850 C05B 1B           CLC
1860 C05C 90D1           BCC LOOP
1870 C05E      :
1880 C05E      : FINISH PROGRAM.
1890 C05E      :
1900 C05E 6B EXIT       PLA
1910 C05F B514           STA $14
1920 C061 60           RTS
1930 C062      :
1940 C062      :
1950 C062      : AN ILLEGAL VALUE WAS ENTERED, SO
1960 C062      : PRODUCE ERROR MESSAGE.
1970 C062      :
1980 C062 4C4BB2 BADVAL   JMP $B24B

```

LABELS:

C062 BADVAL

C05E EXIT

C02F LOOP

C000 START

SPECTRUM 48K HISTORICAL WARGAMING AUSTERLITZ

This game is a re-creation of Napoleon's famous victory at Austerlitz. "You are Napoleon!" The game is played on a physical map of the battlefield with counters representing the units which took part in the battle.

The computer provides a highly sophisticated opponent with 90% of the program written in machine code giving a maximum delay of only 4 seconds as the computer decides its moves and capable of giving even the best of wargamers a serious challenge.

All the mechanics of wargaming, such as movement, combat, terrain effects, reports etc., are taken care of by the computer with the player issuing orders both at corps and divisional level.

The game is for one player only with 3 levels of difficulty and 4 opening strategies for the computer opponent to choose from giving a wide variation each time you play. Your choice of tactics is of course virtually unlimited with the computer reacting in an intelligent manner to them.

Due to the fact that having made its decisions the computer opponent must access the same game mechanics as the player and only has access to the same information as the player we therefore believe this program to be the first genuine computer opponent for wargamers written for the Spectrum and represents a significant breakthrough in this area of computer gaming.

AUSTERLITZ £11.50

also available —

PACIFIC WAR £6.00

Cheques or Postal Orders to:—

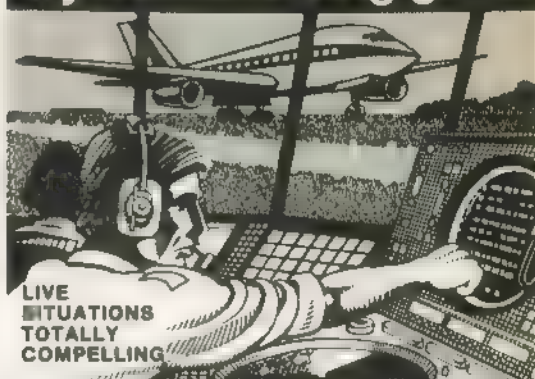
K W Software

155 Ringlow Rd., Sheffield S11 7PS

THE SKY'S THE LIMIT WITH... **AIR TRAFFIC CONTROL**

NEW!

Try this absorbing game



**LIVE
SITUATIONS
TOTALLY
COMPELLING**



By **HAMA SYSTEMS**
For use with Sinclair ZX81 (16K RAM)

ON SALE AT MOST LEADING COMPUTER
OUTLETS. OR BY MAIL ORDER FROM:
SACKVILLE PLACE,
44-48, MAGDALEN STREET, NORWICH.

£6.95

Data to your Commodore and music to your ears

THE ROTRONICS DR2301 AUDIO/DATA CASSETTE RECORDER

- Why should you need two cassette recorders just because you are a Commodore user?
- The ROTRONICS DR2301 has all the facilities you would expect of a quality audio recorder and also works perfectly with the VIC 20 and CBM 64 computers without any fiddly separate boxes or adaptors. Simply connect the DR2301 directly with your Commodore computer via the lead supplied and you are ready to start. The built-in interface circuitry ensures that SAVING and LOADING is completely reliable — even when using commercially produced software. The DR2301 also allows the computer to sense when the PLAY key has been depressed.
- Additional features are auto-stop, tape counter, inbuilt microphone and foldaway carrying handle. The DR2301 is also compatible with the ZX81, Spectrum

and many other popular home computers.

- The DR2301 will take its power from the computer (Commodore only), mains adaptor (supplied) or internal batteries. Each unit carries a full 12 month guarantee.
- All this at a price which is a lot less than you would pay for a dedicated data recorder — just £34.95 (p & p £2.00). Send your order form to (no stamp required):

SMT SMT, FREEPOST, Greens Norton,
Towcester, Northants, NN12 8BR.

VIC 20 and CBM 64 are registered trademarks of Commodore Business Machines.

£34.95

(p+p £2.00)

ORDER FORM

Please send _____ Rotronics audio/data recorder(s) at £35 (inc. p & p) each. All prices inclusive of VAT. Please make cheques payable to SMT. Allow 28 days for delivery.

Name _____

Address _____

PCW 24/5

Open Forum

Open Forum is for you to publish your programs and ideas. Take care that the listings you send in are all bug-free. Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed. We will pay the Program of the Week double our new fee of £6 for each program published.

Falcon Fighter

on Vic20

The aliens are attacking Earth. You are the last of the great warriors and in your Falcon, equipped with air to air missiles, you must save us all from these unfriendly beings.

As you fly low over the cities, you see aliens in the distance. You must choose your strategy and attack boldly.

There are 10 different waves of aliens and you complete a wave every 500 points. But to kill all the aliens you must watch your

fuel consumption.

Variables

W	Which alien
L1	Lives
ALI(1)	Alien No. 1
ALI(2)	Alien No. 2
FU	Fuel
PP	Scroll city
OS, BS, CS	Graphic for city
F	Position of missile
CO	Colour
SC	Score
G	How long missile lasts
AS	Get AS (moving falcon)
F1	When missile is launched
E(1)	Random number for Alien 1
E(2)	Random number for Alien 2

Program notes

The game is in two parts. The first listing must be saved and then run before loading the second.

Program 1

20	Set usable definable graphics
30-120	Date for graphics

Program 2

1-5	Screen display
6	Set volume
8-9	Set variables
90	Set colour of screen
110-130	Set variables to be scrolled
140-142	See if missile has
145-153	Change aliens
159-162	See which key is pressed
163	See if fuel has run out
164-167	Check missile
168	How long missile lasts
169	Make sure you do not go off screen
170-180	Scroll the city below
182-183	Move aliens
220	Set screen for graphics
300-310	See if alien hits you
400-402	Crash routine
500-500	Game over

```

10 REM***FALCON FIGHTER***
20 FOR I=7168 TO 7351: READ J: POKE I, J: NEXT
30 DATA 128, 192, 254, 255, 255, 56, 48, 32
40 DATA 1, 63, 127, 255, 199, 199, 199, 255, 255, 255, 199, 198, 198, 254, 254, 255
50 DATA 128, 252, 254, 255, 227, 227, 227, 255, 255, 255, 227, 99, 99, 127, 127, 255
60 DATA 24, 60, 126, 255, 255, 255, 255, 126, 60, 24, 24, 24, 24, 60
70 DATA 0, 0, 0, 0, 0, 255, 0, 0, 0, 0, 0, 0, 0, 0
80 DATA 31, 127, 191, 255, 255, 255, 66, 0, 0, 12, 10, 127, 255, 255, 66
90 DATA 66, 129, 153, 255, 255, 153, 129, 66, 0, 60, 126, 255, 213, 255, 126, 60
95 DATA 0, 14, 124, 252, 252, 124, 14, 0
97 DATA 146, 84, 40, 0, 40, 84, 146, 0, 255, 213, 255, 171, 255, 213, 255, 171
100 DATA 248, 136, 136, 159, 153, 249, 17, 31, 24, 60, 195, 60, 60, 60, 66, 129, 0, 0, 0, 0, 0, 0, 12
110 DATA 129, 153, 90, 102, 102, 90, 153, 129, 8, 20, 34, 62, 65, 65, 54, 8, 0, 0, 0, 0, 100, 146, 40, 8
120 DATA 1, 3, 127, 255, 255, 28, 12, 4
130 PRINT "LORD FALCON FIGHTER 2"
140 POKE 36869, 255: GOSUB 210: W=13
150 PRINT "SCORE    FUEL"
160 PRINT " "
170 PRINT " "
180 PRINT " "
190 PRINT " "
200 POKE 36878, 15
210 LI=3
220 AL(1)=9030: AL(2)=8064: FU=1000: PRINT "*****FU"
230 POKE 36879, 25
240 PP=0
250 OS=" "
260 BS=" "
270 CS=" "
280 FOR PP=22 TO 87
290 IF PEEK(F)=W THEN POKE F, 14: POKE F+CO, 2: SC=SC+100: POKE 36876, 0: G=9: GOTO 144
300 IF PEEK(F+1)=W THEN POKE F+1, 14: POKE F+1+CO, 2: SC=SC+100: POKE 36876, 0: G=9: GOTO 144
310 GOTO 145
320 POKE 36877, 220: FOR T=1500 STEP-.1: POKE 36878, T: NEXT T: POKE 36877, 0: POKE 36878, 15
330 IF SC=500 THEN W=12
340 IF SC=1000 THEN W=11
350 IF SC=1500 THEN W=10
360 IF SC=2000 THEN W=9
370 IF SC=2500 THEN FU=FU+500: W=18
380 IF SC=3000 THEN W=19
390 IF SC=3500 THEN W=20
400 IF SC=4000 THEN W=21
410 IF SC=4500 THEN W=22
420 GOSUB 300
430 GET A$: IF A$="R" THEN POKE 0, 8: Q=Q-22: POKE 0, 8: POKE Q+CO, 0
440 IF A$="Z" THEN POKE 0, 8: Q=Q+22: POKE 0, 8: POKE Q+CO, 0
450 IF Q>8141 THEN 400
460 IF A$=" " THEN F1=1: POKE F, 8: F=G+1: FU=FU-10: PRINT "*****FU"
470 "E": G=0
480 IF FU<0 THEN 500
490 IF F1=1 AND PEEK(F)=32 THEN 167
500 IF F1=1 AND PEEK(F)=7 THEN 167
510 IF F1=1 AND PEEK(F)=0 THEN POKE F, 14: POKE F+CO, 2: FOR U=1 TO 200: NEXT U: G=5: G=9: GOTO 168
520 IF F1=1 THEN POKE F, 8: F=G+1: POKE F+CO, 2: POKE F, 7: G=G+1

```

(continued on page 37)

RUNESOFT PRESENT

Enter the realm of *Dream and Paradox* — Survive 150 locations on what is probably the most difficult task you've ever been set — If you can!



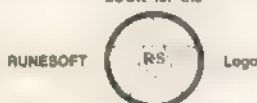
PARADOX



Help Yaw Ning to find *SPOOF* the magic dragon, despite the whole world being set against him. Poor Yaw — You'll probably die laughing.

Popular Computing Weekly (15/04/84): "Paradox" looks, from a quick play and the complex maps I've been sent explaining it, like one of the most complicated adventures ever designed — addition is probably ensured."

LOOK for the



★ ★ COMMODORE VERSIONS AVAILABLE SOON ★ ★
RUNESOFT artwork by Nick Bibby

PARADOX, **SPOOF** and **SPECTREALM** (a strategy game for budding Emperors) for the Spectrum 48K computer are available from selected shops nationwide at the following prices

**PARADOX: £7.50; SPOOF: £7.50;
SPECTREALM: £6.95**

■ In case of difficulty ask your local stockist ■ contact his distributor, or send cheques/PDs direct ■

RUNESOFT

Charnwood House, 67 Lower Parliament St, Nottingham NG1 3BB. (Tel: 0602 (STD) 287667 & 271748)

A great line up of 17 NEW titles... direct from CANADA

FOR ZX81, SPECTRUM VIC 20, C64, ATARI

Just run your eyes over these new titles now available through "SOFTCHOICE LTD" the U.K. subsidiary of the well-known Canadian Software House INTERNATIONAL PUBLISHING & SOFTWARE INC. Purchase with confidence superb EDUCATIONAL, UTILITY and GAMES SOFTWARE!

CHILDRENS' & HOME EDUCATIONAL GAMES for the COMMODORE 64, ATARI 400/800 DISKS Only, at £14.95 each incl.

THE ALPHABET FACTORY For ages 5-9 yrs Spectrum 48K Atari 400/800 Age 5-9 yrs	MATCH UP For ages 5-9 yrs Spectrum 48K Atari 400/800 Age 5-9 yrs	THE WORD BIRD For ages 5-9 yrs Spectrum 48K Atari 400/800 Age 5-9 yrs	TAPE ZONE For ages 5-9 yrs Spectrum 48K Atari 400/800 Age 5-9 yrs	16K For ages 5-9 yrs Spectrum 48K Atari 400/800 Age 5-9 yrs

GREAT UTILITY AND BUSINESS SOFTWARE for ZX81, SPECTRUM, VIC 20, COMMODORE 64, ATARI

FAST FORWARD For ages 5-9 yrs Spectrum 48K Atari 400/800 Age 5-9 yrs	FAST LOAD For ages 5-9 yrs Spectrum 48K Atari 400/800 Age 5-9 yrs	DIET For ages 5-9 yrs Spectrum 48K Atari 400/800 Age 5-9 yrs	CALC-PRO For ages 5-9 yrs Spectrum 48K Atari 400/800 Age 5-9 yrs	GRAPH-IT For ages 5-9 yrs Spectrum 48K Atari 400/800 Age 5-9 yrs

HOW TO ORDER: BY TELEPHONE (01) 431 2494
If you are a Bank Giro or Access holder, please telephone and give your Card No. Name, Address and item required for immediate despatch

BY POST: To purchase any of the items listed above, simply fill in the coupon below, write your Name, Address, enclose your cheque or P.D. made payable to "SOFTCHOICE LTD" and post to us.

Post to: **SOFTCHOICE LTD**
52 PLATTS LANE, LONDON NW3 7NT

Please sign and mail for using form

Name: _____

Address: _____

Postcode: _____

Telephone: _____

Order: _____

Price: _____

Total: _____

Signature: _____

Date: _____

EXCITING NEW GAMES FOR FAMILY FUN AND LEARNING FOR ZX81 and SPECTRUM	ADDING MACHINE Additional facts for ages 5-9 yrs For Spectrum Cassette £5.95	TAKE AWAY ZOO Subtraction facts for ages 5-9 yrs For Spectrum Cassette £5.95	TAPE ZONE For ages 5-9 yrs Spectrum 48K Atari 400/800 Age 5-9 yrs
SIGNALS & CODE See and hear the letters and numbers in order! On demand, randomly, in messages, in code tests! For ZX81 Cassette £4.95	WHIRL OF WORDS Only great agility and cunning will defeat King! Climb quickly or you will be eaten! For ZX81 & Spectrum Cassette £5.95	SPEED SNAKE Slither around mazes 10 different mazes to challenge your skill! Death! For ZX81 Cassette £4.95	M1 MUNCHIEE Race through 3 mazes, avoid the traps! Winning action with practical! For ZX81 Cassette £4.95

SOFTCHOICE LTD.
52 PLATTS LANE, LONDON NW3 7NT
TEL: (01) 431 2494. TELEX: 923753

(Continued from page 36)

```

168 IF@=73THEN@:=0:P14@ POK@.0 POK@36874.0:F=7680
169 IF@.8873AND@.8141THENPOKE@.0 POK@+C@.0
170 PRINTLEFT$:@$.28*LEFT$;RIGHT$;IS$.88*P1+LEFT$(C$.PP+22)
180 PRINT@LEFT$;RIGHT$(C$.88-PP)*LEFT$(C$.PP+22)
181 IF1=1THENPOKE36874.160
182 FORY=1TO1 POK@AL(Y).8
183 E(Y)=INT(RND(1)*3+1
184 IFE(Y)=1ORE(Y)=2THENAL(Y)=HL(Y)+21
185 IFE(Y)=3ANDIE(Y)=8THENAL(Y)=HL(Y)-1
186 IFE(Y)=4FE(Y)=1THENAL(Y)=AL(Y)-23
187 IFAL(Y)=77ANDAL(Y)=8142THENAL(Y)=7921
188 POK@AL(Y).4 POK@AL(Y)+C@.0 NEXT
189 PRINT"#####".SC
190 NEXT
200 PP=@ GOTO140
210 REM
220 POKE52.28:POKE56.28 Q=7908 C@=30720:POKE@.0 POK@C@.0 POK@530.255 RETURN
300 IFPE@.0+1=@THENRETURN
305 IFPE@.0+1=#32THENRETURN
310 IFPE@.0+1>=7THENRETURN
320 IF=1
400 POKE@.14:POKE@+C@.2
402 POKE36877.220 FORU=15TO8STEP-.1 POK@36878.U NEXT L1=L1-1 POK@36878.15 POK@36877.U
877.0
403 POK@U.8
404 IFIF=1THENPOKE@.15 POK@+C@.0 IF=8
405 IFL1=THEN$=0
410 Q=7908 GOTO140
500 PRINT"#####GAME OVER#"
510 FORI=1TO2000 NEXT
550 PRINT"### ANY KEY" POK@36878.0
580 POK@198.0 WAIT192=1
590 RUN

```

Falcon Fighter

by Paul Biddle

Three Unknowns

on Spectrum

There are many programs readily available for solving two simultaneous equations in two unknowns. This program, however, solves three equations in three unknowns. It is based, as for the two equation case, on

forming a matrix of the coefficients of the unknowns, inverting this matrix, and then multiplying the constant terms (in the form of another matrix) by this inverse matrix.

Unfortunately, the inversion of a 3 by 3 matrix is more complicated than is the case for a 2 by 2. This program carries out this inversion, multiplies the constant terms, and prints the value of each of the three

variables.

Program notes

20	Set up arrays.
30-110	Input data
120-200	Finding the cofactors of the matrix (part of the inversion process)
210	Finding the determinant of the matrix.
230-250	Inverting the matrix and finding the variables.
260-280	Printing the results

10 REM PROGRAM FOR SOLVING
THREE SIMULTANEOUS EQUATIONS IN
THREE UNKNOWN BY G.R.YOUNG.

© 1984

```

20 DIM A(3,3): DIM B(3,3): DIM
D(3)
30 FOR R=1 TO 3
40 PRINT "FOR EQUATION ";R
50 PRINT "OF THE FORM AX+BY+CZ
=D"
60 INPUT "A(";R;")=";A(R,1)
70 INPUT "B(";R;")=";A(R,2)
80 INPUT "C(";R;")=";A(R,3)
90 INPUT "D(";R;")=";D(R)
100 CLS
110 NEXT R
120 LET B(1,1)=A(2,2)+A(3,3)-A(
2,3)+A(3,2)
130 LET B(1,2)=-(A(2,1)+A(3,3)-
A(2,3)+A(3,1))
140 LET B(1,3)=A(2,1)+A(3,2)-A(
2,2)+A(3,1)
150 LET B(2,1)=-(A(1,2)+A(3,3)-
A(1,3)+A(3,2))

```

```

160 LET B(2,2)=A(1,1)+A(3,3)-A(
170 LET B(2,3)=- (A(1,1)+A(3,2)-
180 LET B(3,1)=A(1,2)+A(2,3)-A(
190 LET B(3,2)=- (A(1,1)+A(2,3)-
200 LET B(3,3)=A(1,1)+A(2,2)-A(
210 LET DETA=A(1,1)+B(1,1)+A(1,
220 IF DETA=0 THEN PRINT AT 11,
5;"NO UNIQUE SOLUTIONS": STOP
230 LET X=(B(1,1)+D(1)+B(2,1)+D
240 LET Y=(B(1,2)+D(1)+B(2,2)+D
250 LET Z=(B(1,3)+D(1)+B(2,3)+D
260 PRINT AT 6,5;"X=";X
270 PRINT AT 10,5;"Y=";Y
280 PRINT AT 12,5;"Z=";Z
290 STOP

```

Three Unknowns by G. Young

Open Forum

Screen Design on Spectrum

This is a utility program used to construct various screen pictures. Although short, it

has enough features to produce quite pleasing results.

```

5 GO SUB 100
10 LET y=125: LET x=67
20 PLOT INK 1,y,x
30 LET a$=INKEY$
40 IF a$="5" AND y>0 THEN LET
y=y-1
50 IF a$="8" AND y<255 THEN LE
T y=y+1
60 IF a$="6" AND x>0 THEN LET
x=x-1
70 IF a$="7" AND x<175 THEN LE
T x=x+1
80 IF a$="1" THEN GO TO 150
90 IF a$="c" THEN GO TO 170
90 GO TO 20
100 INPUT "Paper " ; p
110 INPUT "Border " ; b
120 INPUT "Ink " ; i
130 BORDER b: PAPER p: CLS : IN
K i
140 RETURN
150 INPUT "New ink colour " ; i
160 GO TO 90
170 LET a$=INKEY$
180 IF a$="5" AND y>0 THEN LET
y=y-1
190 IF a$="8" AND y<255 THEN LE
T y=y+1
200 IF a$="6" AND x>0 THEN LET
x=x-1
210 IF a$="7" AND x<175 THEN LE
T x=x+1
220 IF a$="c" THEN GO TO 90
230 PLOT y,x: BEEP .01,30: PLOT
INVERSE 1,y,x
240 GO TO 170

```

Screen Design
by J Yeomans

Microradio

GW6JJN



Shades of grey

As promised last week here is a review of the G4IDE Microsystems Slow Scan Television program. Since amateur television is invariably sent in monochrome, the representation of pictures on the TV screen generated by the computer (or the ZX Printer, for that matter) poses a problem in that each pixel on the screen can only be either on or off and the necessary shades of grey are not possible. Roger Barker, the author of 'Scan' has got around this problem in an extremely elegant way. He has invented something called the 'Super Pixel'. This consists of four pixel groups which, depending on how many of the group are on or off, will give

five shades of grey. This approach limits the resolution to 128 x 96 which is more than adequate.

When the program is receiving television pictures, the screen can be copied to the printer at any time which makes for some very fine print-outs. Screens can also be saved to cassette for later transmission or viewing or even 'processing'. In this sense, processing is a routine to restore full contrast to low contrast pictures and can be used at any time during receive.

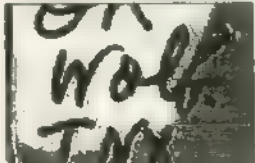
The transmission facilities of this program are simply incredible. The transmitted signal is encoded into a six tone audio system not unlike the



Two tone RTTY signal but more complex. Five tone levels are for the various shades of

grey and the sixth is the synch pulse. Six complete picture screens can be held in memory at any given time all instantly available for transmission.

So how are the screens created? No problem. The program contains two routines to do



just this. The first is a bold writing routine which will create up to six rows of eight characters in normal or inverse. The second is a drawing routine which can create medium resolution pictures or diagrams in five shades of grey. This program, which costs only £10, could be said to be worth the money for these routines alone. All screens can, of course, be saved to tape for further use — in fact, a library of pictures either created or saved from previous on air contacts could make your sta-

tion one of the more interesting and sought after stations in the world, all without breaking the bank.

Of course, the bold writing option can be called and used on air for fairly spectacular results. Extensive instructions on how to construct, receive and transmit interfaces if you don't have such things lying around come with the cassette.

Both Scan and the RTTY program reviewed last week put G4IDE Microsystems in a class of their own as a software house. Roger Barker, the programmer, is to be congratulated in taking the Spectrum where no Spectrum has gone before. G4IDE Microsystems is at 10 Fontwell Road, Wolverhampton, WV10 6PS (tel. Wolverhampton 781760).

Ray Berry GW6JJN

This series of articles is designed for radio and microcomputer enthusiasts alike. If you have any queries that you want answered, hints and tips to share, or topics that you would like to see covered, write to: Ray Berry, Microradio, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD.

Rombug

on Spectrum

This is an exciting arcade style game in

which you must try to prevent your Spectrum being overrun by bugs.

Program notes

2 Jumps ■ Udg subroutine

11-20 Sets up screen
30-47 Variables
50-130 Bug movement
140-300 Players movement
1000-3020 Screen messages
9000-9030 Udg subroutine

```
1 BORDER 4: INK 0: CLS
2 GO SUB 9000
3 LET S=0: LET T=1000
4 BORDER 4
11 PRINT #1: "ROM CARTRIDGES CL
EARED: "
12 PRINT AT 0,0: INK 3: "TIME
13 FOR F=0 TO 21: PRINT AT F,0
: INK 3: "AT F,31: INK 3: "
NEXT F
14 FOR F=0 TO 31: PRINT AT 21,
F: INK 3: "NEXT F
15 LET H=INT (RND*17)+2: LET J
=INT (RND*15)+15: FOR F=H TO H+2
: PRINT AT F,J: FLASH 1: INK 2:
PAPER 0: "NEXT F
16 FOR F=0 TO 31/30: PRINT AT I
H: (RND*18)+2: INT (RND*50): INK
3: "NEXT F
17 LET U1=3: LET U2=1
18 LET A=11: LET B=29
19 LET X=12+INT (RND*5): LET Y
=1+INT (RND*3)
20 LET XX=X: LET YY=Y
21 LET XX=X: LET YY=Y
22 LET T=T-1
23 IF T=0 THEN GO TO 9000
24 PRINT AT X,Y: "
25 PRINT AT 0,7: INK 3: "
26 IF WITH X+1,Y=59 THEN LET
d1=4
27 IF WITH X-1,Y=0 THEN LET
d1=0
28 IF WITH X,Y+1=59 THEN LET
d2=2
29 IF WITH X,Y-1=0 THEN LET
d2=1
30 IF d1=4 AND X<21 THEN LET X
=X-1
31 IF d1=0 AND X>1 THEN LET X
=X+1
32 IF d2=2 AND Y<31 THEN LET Y
=Y-1
33 IF d2=1 AND Y>31 THEN LET Y
=Y+1
34 IF WITH (X,Y)=178 THEN GO TO
1000
140 PRINT AT XX,YY: INK 7: " "
```

```
150 IF INKEY$="0" AND ATTR (a,b
+2)<59 AND ATTR (a+1,b+2)<59 T
HEN LET b=b+1
151 IF INKEY$="5" AND ATTR (a,b
-1)<59 AND ATTR (a+1,b-1)<59 T
HEN LET b=b-1
160 IF INKEY$="6" AND ATTR (a+2
,b)<59 AND ATTR (a+2,b+1)<59 T
HEN LET a=a+2
161 IF INKEY$="7" AND ATTR (a-1
,b)<59 AND ATTR (a-1,b+1)<59 T
HEN LET a=a-1
180 PRINT AT aa,bb: INK 7: " "
AT aa+1,bb: INK 7: "
181 PRINT AT a,b: INK 3: "
300 GO TO 45
1000 PRINT AT 10,11: FLASH 1: "WE
LL DONE"
1010 FOR G=4 TO 1 STEP -1: FOR F
=0 TO 30 GILP 0: DILP 0/100: F: B
EEP G/100: F=30: NEXT F: NEXT G
1020 FOR S=5+1
1030 CLS: GO TO 4
2000 STOP
3000 PRINT "TIME RAN OUT AND THE
BUG RUINED YOUR ROM!!!! PRESS
ANY KEY TO PLAY.
3001 PRINT "YOU SAVED "S" SPEC
TRUMS.
3005 FOR I=50 TO 0 STEP -1: BEEP
.01: F: NEXT I
3010 IF INKEY$="" THEN RUN
3020 GO TO 3010
9000 FOR I=144 TO 145: FOR N=0 T
O 7: READ A: POKE USR CHR$ (I+N),A
: NEXT N: NEXT I
9010 DATA 255,129,BIN 10111101,B
IN 10100101,BIN 10100101,BIN 101
1101,129,ELC
9020 DATA BIN 00111100,BIN 01000
010,255,BIN 11100111,BIN 1010010
1,BIN 10111101,BIN 11000011,BIN
01111110
9025 DATA BIN 11011011,BIN 10011
001,BIN 00111100,255,255,BIN 001
11100,BIN 10011001,BIN 11011011
9030 RETURN
```

Rombug
by J McMarrough

Arcade Avenue

Cartoon art

By now all regular readers of BPCW must be well and truly fed up with the debate raging on the letters page about the merits or otherwise of arcade high score tables. In fact, at times the argument has degenerated into the merits or otherwise of anyone who dares use their electronic marvels for arcade games.

Aside from the fact that everyone has a right to their own interests, and that games are one of the oldest and most necessary human pastimes, there are many arguments to support the computer games-player. For instance, all computer users benefit from the

mass sales and low prices that are in a large part fuelled by an interest in games (and you only have to look at the specification of new low price machines such as the Spectravideo or the Flan Enterprise to see how games have influenced their design).

Similarly, games are the the most user friendly way of promoting computer awareness and an interest in programming. Hence the increase in sales of the myriad 'machine code made simple' books which suggest that the desire to write fast and furious games is producing in the public a degree of expertise that would once have only been found in the professionals.

People are learning that computers are not just malevolent leviathons that function only to add a row of spurious zeros to gas bills, and that they can improve our lives in undreamt of ways.

I think it is about time that we dispelled the misconception that computers should only have serious applications such as science, business or education — they should also complement the artistic side of life. American universities spend millions developing more and more complex graphics and animations systems. In the arcades we are already beginning to see games of a graphic complexity approaching that of cartoon movies, that can in-

teract with and respond to the skills and desires of the player. It may be an art form.

And now a request. What are the best versions of classic arcade games for your machine? Which Pac Man, Defender, Buck Rogers, Dig Dug, etc, would you advise your friends to buy? — let us know.

Tony Kendle

The Arcade Corner is a new section for anyone who enjoys playing arcade games. If you have any comments, from playing tips on difficult games or programs you'd particularly like to praise (or blame) then write to: Tony Kendle, Arcade Avenue, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD.

Available for
COMMODORE 64
DRAGON 32 TANDY COLOUR

Cuthbert in Space




The Federal Chief has decided that Cuthbert is to go on a mission of plunder against the Moronian's Solar System. Cuthbert lands his space craft on each planet but then has to refuel by stealing pods from the Moronian fuel dumps whilst avoiding the Solar Meteoroid Barrage.

After filling up he goes and plunders as much loot as possible before take-off. All could go well but when he gets a mal-function he must send a pilotless shuttle to obtain spares and take-off before the Moronian's bomb detonates.

CASSETTE £8 DISK £9.95

Mail Order Sales from
Microdeal Mail Order 41 Truro Rd,
St. Austell Cornwall PL25 5JE

Credit Card Sales   
Phone 0726 3458



Dealers Contact

MICRODEAL DISTRIBUTION


0726-3456

or **WEBSTERS SOFTWARE**

0483 62222

MICRODEAL

Selected Microdeal Titles available from computer dealers nationwide or from larger branches of

 **John Menzies**

and



ULTIMATE



THE NOT-50 SOFTWARE

CAN YOU HANDLE THE **ULTIMATE**?

THE MOST AMAZING PROGRAMMES, THE SMOOTHEST ACTION, THE HIGHEST RESOLUTION GRAPHICS?

ALL **ULTIMATE** GAMES ARE ARCADE STANDARD,

FEATURE PACKED, 100% MACHINE CODE.

AND PURE ADDICTION.

SO WHICH WILL BLOW FIRST - YOUR COMPUTER OR YOUR MIND?



Cookie 16/48K ZX Spectrum



Tranz Am 16/48K ZX Spectrum



Atic Atac 48K ZX Spectrum



Pootle 16/48K Spectrum



Lunar Jetman 48K ZX Spectrum



Jet Pac 16/48K ZX Spectrum or 8K Expanded VIC 20

ONLY £5.50 EACH

(All games joystick or keyboard control)

Available from: W H Smith, Boots, John Moores, Spectrum Centres, large department stores and all good software retailers. ☐ send the coupon direct. We'll pack and post your order to you absolutely free in the UK.

Okay, I dare take my computer to the edge of meltdown. Send me the following:

☐ Cookie ☐ Lunar Jetman ☐ Pootle ☐ Tranz Am
☐ Jet Pac ☐ Jet Pac - Expanded VIC 20 ☐ Atic Atac

I enclose cheque/PO for £ _____ Name _____

Address _____

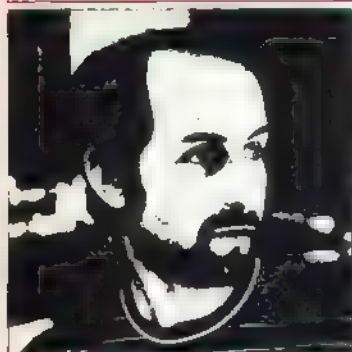
Code _____

Send to:
Ultimate Play The Game,
The Green,
Ashby de la Zouch,
Leicestershire.



Ultimate Play The Game is a trade name of Ashby Computers and Graphics Ltd., The Green, Ashby de la Zouch, Leicestershire, Tel (0530) 411455. Dealer enquiries welcome.

Tony Bridge's Adventure Corner



Hollywood Trilogy

A couple of weeks ago, I mentioned *Nosferatu*, a Quill'd adventure from author Graham Shaw. He has contacted me to tell me that it is now being marketed by Classic Software, which you'll find at: 105 Church Lane, Cross Gates, Leeds LS15 8JD.

The packaging, which I felt was an important part of the adventure, and a facet of the game that lifted it well above the usual Spectrum adventure, has, thankfully, been retained. *Nosferatu* is the first part of a trilogy, the other parts of which are *The Connecticut Apple Affair* and *Guess Who's Coming To Dinner?* — sound like this should be called *The Hollywood Trilogy*! Each part will be self-contained, but on completion of the first two parts the player will be given a special code which will grant entry to a couple of special locations in the following program. The second and third parts should be available any time now, and

if they're as good as *Nosferatu*, then I can recommend them.

Graham makes some interesting comments in his letter. In saying that there will be no help sheet available (though individual queries will be answered), he explains: "... this is because such sheets either seem to end up as step by step 'how to do it' instructions (eg. Artic's), or by making the player work for his clue, end up being so cryptic that the unfortunate adventurer needs a help sheet for his help sheet!"

I think that help sheets can be an important aid to solving the adventure, but Graham is right, they have to tread a rather perilous middle path and can be more of a frustrating experience than the very adventure they're designed to help solve. I hope to do a comparison of help sheets in the near future, so if you have anything you'd like to say about the subject, just drop a line to the Grand.

Graham goes on: "10/10 for Mr Valentine's adventure ratings (Vol 3 No 11) — such lists will prove most useful! Here's a list of the adventures I've encountered:

SHIP OF DOOM — **ARTIC** (5/10): coming in for a lot of stick recently — not for feminists or lovers — children often difficult but lacking in detail and depth.

GOLDEN APPLE — **ARTIC** (7/10): the best of the Artic range — but beware the help sheet!

SHOWBALL — **LEVEL** 9 (9/10): illogically logical but impossible to map. If you find you can't progress, take a tip from Ala ddn!

DUNGEON ADVENTURE — **LEVEL** 9 (10/10): "er... it's!"

THE ISLAND — **CRYSTAL** (7/10): you'll love it or hate it. Packed full of gimmicks.

VELNOR'S LAIR — **QUICKSILVA** (7/10): a pleasant surprise: plenty of problems and plenty of monster-bashing.

MOUNTAINS OF KET — **INCENTIVE** (7/10): nice combat routine, but try not to use it too often!

THE VALLEY — **ASP** (5/10): overpriced.

MAGIC MOUNTAIN — **PHIPPS** (6/10): rather slow

response time, also some pictures take a long time to draw.

"This list is for the Spectrum, although the Level 9 adventures seem to be available for every micro under the sun. CBM owners should lay their hands on a copy of *Twin Kingdom Valley* at all costs!! Incredible graphics!"

Many of you have sent me lists of your favourite adventures, with ratings, and I think that this is a good idea — I can't even see, let alone complete all the adventures now available, and your lists are a good way of giving people an idea of difficulty, value for money and so on. One or two letters suggest a rating based on time taken to complete an adventure, but I imagine everyone takes their own pace, and while some people take two hours to finish *The Hobbit*, others are content to take it easy and till several weeks. I'll try and make a regular feature of such lists in the future, if you keep sending them.

Victoria Dunne — North Shields has sent in some clues to some Spectrum adventures. In a change from the usual Corner Code, I have included, at the end of the Corner, a list of relevant words. If you are playing *Transylvanian Tower* 5-9-19-22-4-10. In *Planet of Death*: 6-4-23-20-11-4-18-3-21-13. And finally, in *The Hobbit*: 14-7-17-11-7-24-8-2-16-26-15-8-12-25-28-1.

Are you on Micronet-800? If so, you'll be interested to know that several people have recommended *Orb of Orion* which you will find there. Give it a whirl, it's supposed to be rather hard!

Finally, before I disappear down the hole, I must ask everyone who has sent adventures to the Grand Elf to be patient — he has an awful lot to look at, but every one is looked at! And I haven't forgotten you, Mr Hugh T Walker, I shall be going through your points soon.

Are you stuck in an adventure? Are you faced by a problem that seems insurmountable? *Adventure Helpline* may be the answer.

Adventure Helpline is, quite simply, designed to put adventurers in touch with one another. Where you may be stumped by a baffling puzzle, a fellow adventurer may be able to help. By the same token, you may be able to help other people with their problems.

If you are having difficulties with an adventure, fill in the accompanying coupon and send it to:

Adventure Helpline
Popular Computing Weekly
12-13 Little Newport Street
London WC2R 3LD

We shall publish *Adventure Helpline* entries each week in their own special column.

Adventure Helpline

Micro

Adventure

Problem

.....

Name

Address

.....

- | | |
|------------|---------------|
| 1 DOOR | 15 KEY |
| 2 GET | 16 CACHE |
| 3 ONE | 17 SEQUENCE |
| 4 THE | 18 NOT |
| 5 YOU | 19 BUTTONS |
| 6 PRESS | 20 TWO |
| 7 GOBLIN'S | 21 NEED |
| 8 TO | 22 LIFT |
| 9 DO | 23 DUNGEON |
| 10 MIRROR | 24 MOUNTAIN'S |
| 11 IN | 25 CURIOUS |
| 12 OPEN | 26 TO |
| 13 THREE | 27 SIDE |
| 14 BREAK | |

This series of articles is designed for novice and experienced Adventurers alike. Each week Tony Bridge will be looking at different Adventures and advising you on some of the problems and pitfalls you can expect to encounter. So, if you have an Adventure you want reviewed, or if you are stuck in an Adventure and cannot progress any further write to: Tony Bridge, Adventure Corner, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD.

CBM 64 — VIC PRINTER

For only £79.90 fully inc!

"Very good — and good value too" Commodore User Review Dec 1983.
Probably the world's cheapest Vic/64 Printer, but better print quality than
printers three times the price! Put the superb ALPHACOM-32 Printer (or
ZX-Printer) on your Vic/64 using the

SOFTX PRINTERFACE

Printerface alone only£20.95 fully inc!
Alphacom system complete only£79.90 fully inc!
Vic Wordprocessor package only£9.95 fully inc!
(64 version T.B.A.)

- * Alphacom-32 printer already established in W.M. Smiths,
John Mannion KRP £80.00
- * Prints in blue or black on economical write paper (costs
1.3p per foot)
- * Very robust and hardwearing! Gives consistent, high quality
print
- * Sheet fed fast: up to 90 characters per second
- * Full Vic/64 graphics as well as user defined characters
- * 64 column printer with superb formatting facilities
- * Excellent high resolution graphics
- * Operating commands same as Commodore Vic/64 printer
- * Works on Sinclair's ZX-PRINTER (Needs ZX-power supply,
£8.95 fully
inc!)
- * Fast delivery — friendly backup — simple to use!
- * Not a plotter, but a fast dot-matrix printer
- * Money back within 7 days if not satisfied

SOFTX
Computer
Accessories

Send orders/enquiries to:
Dept W3
SOFTX COMPUTERS, 37 Wheaton Rd.
Bournemouth BH7 6LH, Tel 0202 422028.

Walters

LOOK

GAMES PROGRAMMERS

You could be earning

£20,000 +

for your game!
whatever the machine

**SO SEND THEM TO US
NOW!**

Send tape and instructions to:
Ian Smart, Software Development Manager,



Walters Computer Systems Limited,
12 Hagley Road,
Stourbridge,
West Midlands DY8 1PS.

Q L

£49.00
INC

PARALLEL PRINTER INTERFACE

AVAILABLE NOW

- * 12 months guarantee
- * Fully self-contained with connectors and
3.0 metre cable
- * Plugs into Sinclair QL's RS232C port and
- * Drives any CENTRONICS compatible printer, eg, Epson
Seikosha Juki OKI NEC Shinwa Star MCP-40 Roland, etc, etc.

To order send name & address with cheque to
MIRACLE SYSTEMS LTD
6 Armitage Way
Kings Hedges
CAMBRIDGE CB4 2UE
Tel: 0223-312886
Ask at your local computer shop.
Sinclair and QL are trademarks of Sinclair Research Ltd

DRAGON BBC SHARP M2700 SPECTRUM

NEW EDUCATIONAL SOFTWARE CHOOSE ANY 3 FOR THE PRICE OF 2

TELL THE TIME - DRAGON - £5.50

Helps personalising both the graphics and sound designed to teach
children how to tell the time. The first being for the very young and the
after for the students of French and German.

FIRST LETTERS AND WORDS - DRAGON, BBC - SPECTRUM

A picture program that uses graphics to teach young children how to
correctly learn letters of the alphabet and use them in simple words and
sentences.

ABC - DRAGON - £5.50

A spelling and letter recognition program using animated pictures
graphics and sound. This software program will amuse and educate
children for hours.

MATHS TUTOR - DRAGON, SHARP M2700 - £5.50

A set of three (plus extras) designed to teach simple mathematics to young
children (1-10). The package also includes a test sequence for
each level allowing them to test their own progress.

'O' LEVEL/CSE PHYSICS (PART 1 - LENGTH) -

DRAGON, BBC - £5.50

Helps to teach the basic concepts of length and measurement
and also the use of the metric system.

'O' LEVEL/CSE PHYSICS (PART 2 - VOLUME) -

DRAGON, BBC - £5.50

This will help to teach the basic concepts of volume and
measurement and also the use of the metric system.

MUSIC TUTOR - DRAGON - £5.50

Teaches the basic concepts of music and helps to teach the
use of the metric system.

ABACUS SOFTWARE URGENTLY REQUIRES

ORIGINAL COMMODORE 64 & SPECTRUM

Educational and Machine Code ARCADE GAMES

for details ring **BOLTON 383839**



Trade - Distributor Enquiries

Generous Dealer Discounts

Ring **BOLTON 383839**

MANY MORE PROGRAMS AVAILABLE

SEND S.A.E. FOR DETAILS



Peek & Poke



PASSWORD ONLY

Adrian Hodge, 150 Greenock Road, Largs, Ayrshire, writes:

Q I have a BBC model B. I write a lot of my own programs, and I would like to know how I can program the computer so that only I can get into the programs. For example, you would need a code or password. This has been puzzling me for quite some time - perhaps you could give me an answer.

A One way of doing this would be to require a password to be entered before the program will properly start. This could be achieved by placing the following Basic statements at the beginning of your programs.

```
10 LET L=1:LET PS="ADRIAN"  
11 L=1  
20 LET AS=LENKEYS  
30 IF AS=0 GOTO 20  
40 IF AS=MID$(PS,L,1) GOTO 10  
50 IF (L=LEN(PS)) GOTO 20
```

The string PS is used to contain the required password, the length of which is contained in the variable P. Until the correct sequence of keys has been pressed, the program will not proceed past line 50.

JOYSTICK CONVERSION

R Edwards, 29 Newbridge Road, Port Talbot, West Glamorgan, writes:

Q I would like to know if there is an easy way of converting a Dragon 32 program that uses joysticks to use the keyboard instead.

A I have a specific program in mind and I have tried but with no success so far. The program has a line denoting two joys-

ticks and I would like to convert it to use the arrow keys.

A I would also like to know if anyone has given any thoughts on writing a book on the Error codes and the best way to get out of them. I mean the error codes that occur most often eg. FIC Error: O/D Error: and that sort. I'm sure that it would be a good seller.

A You will have to replace all the joystick statements with tests for the appropriate cursor keys. This may be a laborious process, but it is the only sure way.

You should bear in mind that a game designed specifically for joysticks is unlikely to be as easy to play using the keyboard. But, if you want to do this, who am I to stop you.

One last point. You had better check that the keyboard hasn't been disabled (by a *Poke*), before you try all this. It is quite a common feature of joystick oriented games that the keyboard scanning routine is interrupted to speed things up.

CRYSTAL CLEAR

A Ravles, 26 Ashleigh Road, Pontefract, West Yorkshire, writes:

Q I would like to know why the keyboard on my ZX81 locks up after around 10 minutes use. The screen display is terrible, as I hear is the norm, but after about 10 minutes the display goes crystal clear. When this happens the keyboard is disabled.

Is this a general complaint with the machine and is it rectifiable? Could it be my tv set which is causing the trouble?

A Your problem lies with the ZX81 and not your tv. If you do not have a 16K Ram pack, then I am afraid that to repair it will necessitate some specialist repair work.

If you do have a 16K Ram pack, then this is what you do. You will need to remove the internal 1K RAM chips. These are marked 2114 and there are two of them inside the ZX81.

If you don't fancy doing this yourself, then try a tv repair shop - they will be able to do this for you.

QL PRINTER

Stephen Grieff, 1 Chalfont Grove, Hastings Hill, Sunderland, writes:

Q I am thinking of buying a Sinclair QL for a small business, and I will need a good printer to go along with it. I will pay up to the £400-£500 mark for a printer. Please could you suggest some RS232-C based printers in this range?

A There are quite a few printers in your price range, but I would tend to go for either an Epson RX-80 (dot matrix) or a Brother HRL5 (daisywheel). The Epson retails at around £320 and the Brother at around £430.

ABOVE RAMTOP

L W Dewhurst, 8 Stirling Avenue, Leamington Spa, writes:

Q On page 157 of *Machine Code Applications for the ZX Spectrum* by David Laine, published by Sunshine, is the advice - "Assemble your code to run at high memory addresses, but leave enough room between the end of your code and the Spectrum UDG pointer location for the stack... In general, you will be alright if the end of your code is at about 63500 with a 48K machine."

But, I always thought that if one left machine code above Ramtop (reducing Ramtop is necessary beforehand) it would be out of reach of the stack - ie, that the stack would always be below Ramtop. Would you therefore please explain his advice?

A What I think David is getting at is the fact that you can relocate the stack in a machine code program (using the stack pointer), and that he is simply suggesting that you

locate the stack at address 63500.

You must have noticed that quite a lot of commercially produced machine code programs use most of the Spectrum's Ram, implying that Ramtop has been reduced to a very low value. This would mean that there would be no room for the machine stack, unless the facility existed to relocate it somewhere else in memory (normally at the top).

BASIC PLOTTING

James Youngman, 86a Cai Hill, Cockfosters, London, writes:

Q I would like to know whether *Xor (Eor)* plotting is possible in Basic on the QL as it is on the BBC B?

A The easy answer to this is maybe. As you have no doubt heard, Sinclair have had a few problems fitting Superbasic into the QL Rom. Until the 'real' QL appears, I can only guess at what facilities will be finally available.

TRACK RACE

Mark Colman, 42 Carlton Avenue, Kenyon, Harrow, Middlesex, writes:

Q I've got a 16K expanded Vic 20, and I keep looking for a game which simulates a car on a track. I've got *Race Fun* by Rabbit Software, but it only shows one section of road at a time, also it doesn't go round corners.

I'm looking for a game like *Chequered Flag* on the Spectrum. Have you seen any game of this description?

A The only car racing game I've seen is *Race* which is produced by Commodore at £4.99. I don't know of any others for the Vic, does anyone out there know different?

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem *Peek It to Phil* Rogers and every week he will *Poke* back as many answers as he can. The address is *Peek & Poke*, PCW, 12-13 Little Newport Street, London WC2R 3LD.

MERCURY HOUSE **GAMES FOR** **AQUARIUS** **MERCURY HOUSE**
UNEXPANDED MACHINE

Gamespack 1 contains - Bombadier, Fruit Machine, Hangman, Alien Descent, Escape - £4.99

Gamespack 2 contains - Dungeon Adventure, U-Boat, Golf, Starcatcher, Moonraker - £4.99

SPECIAL OFFER
BOTH TAPES ONLY £7.99

Din to Din or Din to Jack - £1.75

CHEQUES, POs TO

MERCURY HOUSE
PO BOX 157, MANCHESTER M60 1PP

Mail order only Trade enquiries welcome
Please allow 14 days for delivery

GOLD CREST MAIL ORDERS ONLY
UNIT #7, 9 WINCHESTER ST, LONDON W3 **TOP SAVINGS**

SPECTRUM 16K from £85. 48K from £112.
BBC MICRO from £370. **COMMODORE 64** from £175.
QUICKSHOT JOYSTICK I from £8.95. II from £10.95

CMB 64 NEW SOFTWARE SPECTRUM

Hobbit RRP £14.95 ORP £10.95	Maurice meets the Bikers RRP £6.00
Menic Miner, Crazy Saloons, Ugh, RRP £4.50	Ah Odddums RRP £4.50
Scramble, Squash Frog, Googaboo 64 RRP £7.95 ORP £3.50	ORP £4.50
Laser Zone RRP £7.95 ORP £3.50	ORP £4.50
Super Pipeline RRP £6.90 ORP £3.50	ORP £4.50

MANY MORE IN STOCK. NAME IT. WE HAVE IT.
FOR ORDERS UNDER £10.00 AND OTHER DETAILS SEND SAE.
PLEASE ALLOW AT LEAST 28 DAYS FOR DELIVERY.
ENQS. PLEASE CONTACT MRS ALAM ON: 01-992 1362 x 126

NOW 3RD GREAT YEAR! **HIRE** **SPECTRUM and ZX81 PROGRAM TAPES**

FREE ILLUSTRATED QUARTERLY MAGAZINE WITH TIPS, NEWS, REVIEWS, DISCOUNT OFFERS PLUS **TOP 60** TAPES CHART BASED ON TOTAL SALES OF SCORES!

JOIN OVER 30,000 DELIGHTED MEMBERS!

UP TO 2 WEEKS FROM ONLY 64P + P/P & VAT!

NOW READ THE FACTS

We were the first Sinclair library, and have since built up a vast stock - apart from over 200 different programs costing up to £15 each, we maintain a supreme service with up to 30 copies of the most popular ones. We're run not from a back-room but from our own shop and offices which members can visit or phone - we still give prompt, friendly help. Plus our free magazine and guaranteed satisfaction.

WHY SETTLE FOR LESS?

To: **SOFTWARE LIBRARY**, Farnham Road, West Liss, Hants GU33 6JU

NAME _____ Machine _____

ADDRESS _____

THE ORIGINAL SINCLAIR LIBRARY!

Special offer from this issue: **LIFE MEMBERSHIP £8** (normally £5.50). Overseas (Europe only) £10, or join a local branch. Standalone: Pader (Lykkesvej) 2300 Copenhagen 5. Benelux: Jacobsmitslaan 75, 9-2400 MDL, Belgium. W. Germany: Postfach 7809 4800 Bielefeld. S. Africa: PO Box 1786, Morningside, Durban. Singapore: 122 South Circular Rd., Duxton 8. PCVX

ATTENTION! ATTENTION! ALL COMMODORE USERS!

Do you use tapes? Are you sick and tired of waiting for your programs to be Loaded/Saved from/on the tape? Then you need a **TORNADO!!** Tornado allows you to Save/Load/Verify your Basic/machine code programs faster than a CBM 1541 disk drive does!! Due to popular demand! Tornado now comes with new and more powerful commands plus extra instructions to assist you in making fast versions of your existing machine code/BASIC programs. Tornado is available on tape for CBM 64 and BK+ Vic 20.

Do your Run/Stop and Restore keys often fail? Do you want come out of those crashes?! Or get into those unbreakable programs?! Then what are you waiting for, get yourself a **BREAKER!!** Reset switch and let your computer know who is the boss! Breaker can be connected to your machine in seconds, no soldering. Included with the Breaker reset switch is extra backup software on tape. Breaker is now available for any CBM 64 or Vic 20.

Available for CBM 64 and the Vic 20 now is the **ROM-FILE** which contains a complete disassembly of CBM 64/Vic 20 Rom with comments! As well as a complete description of 6502/6510 instructions and addressing modes + a complete listing of a machine code monitor and more!

Please make cheques/PO payable to:

BSF COMPUTER SERVICES LTD.
DEALERS AND GENERAL ENQUIRIES
TEL: 079882240

MAD SUMMER OFFER!! A FREE BREAKER WITH EVERY TORNADO IF YOU USE THIS COUPON!!

Please send me..... Tornado at £9.95 + my free! Breaker

Please send me..... Breaker at £7.95

Please send me..... Rom-File at £7.95

I enclose cheque/PO/cash to the sum of £.....

Name..... Computer.....

Address.....

Please use this form and block letters only. All prices are inclusive of p&p (mail order only, add £2 if outside UK). Please post to:
BSF CSL, 20-28 BOLSOVER STREET, LONDON W1.

CLASSIFIED

Semi-display — £5 per single cc
Lineage — 20p per word

CALL DIANE DAVIS ON 01-437 4343 FOR SEMI/DISPLAY ADVERTISING

GAMES SOFTWARE

BESTSELLERS LIST

MANIC MINOR	CBM64	£8.50
SPACE PILOT	CBM64	£5.95
HUNCHBACK	CBM64	£5.95
CHINACIDEAL	Dragon	£9.75
U23H	Dragon	£5.95
CRUSGPIE	Dragon	£4.50
JETSET WILLY	Spectrum	£8.95
LURAP JETMAN	Spectrum	£2.95
ALCHEMIST	Spectrum	£4.50
JAPAC	Vic 20	£4.95
MI GAT AC LLAMA	Vic 20	£4.95
TELEJUN LITEN	Spectrum	£14.95
Dragon		
.....		£9.95

All prices inc. p&h. Cheques to
ORIGI SOFTWARE,
61 Prince St, Rochdale, Lancs.

COMMODORE 64. Are these games bowwing you? Manic Miner, Revenge Mutant Camels, China Minor. Want to get really high scores? Now you can have hundreds of lives, start on any screen of these and other top 64 games. Send £5.50 (Cheque P.O.) for reset switch and full instructions, including how to load most games faster to S. Mainwaring, 19 Heol Saffron, Morriston, Swansea SA6 6EH.

SPECTRUM GAMES

WE ONLY SELL THE BEST
ORDER TO-DAY: DELIVER TO-MORROW
POSTAGE AND PACKING FREE

SPECIAL OFFERS

ALL 48K

JET SET WILLY	£4.95	NIGHT GUNNER	£5.95
HUNCHBACK	£5.90	THE SKULL	£6.95
BLADE ALLEY	£4.95	THE HOBBIT	£11.95

WRITE OR PHONE FOR OUR SUPER NEW BROCHURE
PACKED FULL OF REVIEWS AND EVEN MORE
SPECIAL OFFERS ORDERS WITH CHEQUE/P.O. TO:
CYGNUS TWO COMPUTER GAMES
62 WOODLAND ROAD, CHINGFORD, LONDON E4 7EU
TEL: 01-529 1891. ENQUIRIES WELCOME

£1,000 PRIZE

for the winner of
GOLDEN
QUEST



REAL ADVENTURE PUZZLE
MADDENING HYPNOTIC ADDICTIVE

FOR 48K SPECTRUM

£7.50 (including p&h) from Marshallgate
Lis. 27 St. Michaels St. Caldmore,
Walsall,
West Midlands.

ADVENTURE—DRAGON 32. The
Scarlet Crystal, exciting, fun and highly
addictive. Only £4. From Mystic Sol
Ware, 58 Balton Crescent, Hamilton,
Lanarkshire.

HOBBIT hint sheets. Solve your problems
for just £11. Send cheque/P.O. and
SAE to M. Twibell, 66 Liberty Place,
Sheffield S85 0Q.

ZXB1 1K 8-gamo cassette. Fight Laser-
Gates, Land Harriers, Attack Missiles &
much more! All for just £2.99 inc. D.A.
Spencer, 230 Lowrange Avenue, B.
Lingham, Cleveland.

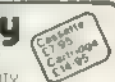
VIC 20 (unexpanded) games. Pinball,
Horse-racing game with hires graphics.

motor-biker, nde across winding paths,
changing gears. £1.99 each or 3
together for only £4.50. D. Spencer, 230
Lowrange Avenue, Bilingham, Cleve-
land.

PUNTERSAL for the Spectrum. The
DIY racing system that proves itself with
practical demonstration from actual re-
cent race. Security locked with personal
password. Plus bets selector. Plus
winnings calculator. Outright purchase
price £25 or 3 and promise to share
winnings. Send either figure now for
your own personal money spinner.
Puntersal, 77 Darby St., Derby DE3
6UE.

UTILITIES

**Friendly
Face**



MICRODRIVE UTILITY

ADDS 15 new microdrive utilities to basic
MERGE with Myrmidon's "FRIENDLY" and
COPIES - essential utilities for microdrive users.



P.O. Box 442, London NW7 7JF
Phone 01-437 1572

"VU-FILE" Microdrive? Yes this basic
and machine code program when
added to your "Vu-File" enables it to
operate with your Spectrum. Fitted
with Interface one and microdrive.
Cassette and instructions £2.95.
DraySoft 2 Bedford Way, Rugeley,
Staffs.

MMI Software "UDG 96" SPECTRUM

A graphics tablet which lets you work on
sets of 96 chars (or the standard 21 char
set). M.C. routines give a fast (adjustable)
response to over 20 options: MIRROR
REVERSE, ENLARGE, ROTATE,
SCROLL, PINCH, etc. £K On screen
guide 8-8 up to 24-24 (for block
options). 2 viewing modes (3 printout
modes). Instructions on using sets within
your programs included. Cheques/P.O.
for £3.95 to MMI Software, 41 City Road,
Cambridge or SAE for full details.
Professional Software at a fair price.

HYPERSAVE 64

Get the most from your Commodore 64
Datassette. When saved with
Hypersave any program (Basic or
M-code) will independently reload in 7
times normal speed. 4 additional basic
commands. Auto-run facility. 48K of con-
tinuous program space available. Fast-
loader is self contained in the tape
header. Just switch on and load. Why
buy disk? Hypersave is nearly as fast.
Well documented. All m/c fast despatch.
Cassette £7.50p or SAE to:
DOSOFT (DEPT P)
2 OAKMOOR AVENUE
BLACKPOOL FY3 0EE

Still printing only 32 characters per
line in your Spectrum BASIC
programs?

There is a TOTAL choice you know!

"Micro-print 85"

gives you not only 64 but also 36, 42, 51
and even 85 pitch printing onto all 84
screen lines and/or the ZX printer, plus a
1-24 line screen COPY command. The
code (only 1.1 k bytes) is utterly simple
to use, offering any mix of all six pitches
at any location. Thousands of delighted
users already know it. "Micro-print 85"
is the most versatile multi-pitch utility you
can buy! The 16 and 48k cassette with a
full "Demo" program are just £5.00
(£6.00 export) from

Myrmidon Software

PO Box 2, TADWORTH, SURREY
KT20 7LU.

DOUBLE THE STOR- AGE CAPACITY OF YOUR SINGLE SIDED DISKS

☆ No extra cost for double
density disks

☆ Forward to:

FLIPSIDER
75 Wallon Rd, East Molesey,
Surrey KT8 9RH

(We recommend recorded
delivery)

Enclose £1.50 + 75p P+P
Allow 7-10 days for return or
send S.A.E. for further details

CLASSIFIED ADVERTISING RATES:

Line by line: 20p per word,
minimum 20 words.

Semi-display: ■ per single col-
umn centimetre, minimum length
2 cm. (Please supply A.W. as
PMT. Or supply rough setting
instructions.)

Conditions: All copy for Classi-
fied section must be pre-paid.
Copy date 7 days before publica-
tion.

If you wish to discuss your ad,
PLEASE RING Diane Davis 01-
437 4343.

Here's my classified ad.

(Please write your copy in capital letters on the lines below.)

Please continue on a separate sheet of paper

I make this words, at per word so I owe you £

Name

Address

.....

.....

Telephone

Please cut out and send this form to Classified Department, Popular Computing Weekly,
12-13 Little Newport Street London WC2R 3LD

SOFTCELL'S DISCO

For the Commodore 64

This is the most powerful tape to disk transfer utility you can buy. No program (rewriting is necessary) Why put up with second best? A must for all 1541 disk owners.

Only £9.95 and 50p p&p

Available from:

THE SIX-FOUR SUPPLIES CO
PO Box 10
Whitstable, Kent
CT5 1TJ

ACCESS-BARCLAY CARD ORDERS OF
(0227) 266289

COMMODORE 64 tape to disk transfer utility. Transfer your cassette software onto floppy disk. £5.00 S. J. Dawes, 71, Belburn Lane, Darlington, Co. Durham, DL3 0LW.

'AUTO-MERGE' an amazing utility that merges and loads 'auto-start' programs from ZX microdrives to enable inspection and modification! £3.95 Alan Turnbull, 65 Vicarage Rd, Stockport.

TELETEXT on your Spectrum: Create your own 900-page teletext system using 'ZXTEXT'. Full-colour text and graphics, flashing, 24-hour clock with alarm, rolling page facility, free sample system - it's all here! Build up a teletext tape library. £4.95 from Ian Stewart, 17 Torry Drive, Alva FK12 5NQ.

(S)TOP SECRET(S)

Now for COMMODORE 64 and 48K SPECTRUM.

Put us back in full control of programs on YOUR computer.

A machine code utility that STOPS most BASIC or MACHINE CODE programs, protected or not, without crashes.

If you can stop them, you can reveal their SECRETS.

TEAR, LIST, MODIFY etc.

The drive MICRODRIVE/DRIVE comparison PLUS an advanced READER/READER PLUS A Hex/Dec/Dec/Hex converter. PLUS Pages of information about how the professionals keep their secrets hidden.

(M Code options re-locatable under software control)

SPECTRUM 48K £8.95 COMMODORE 64

(state which in order)

(also available on microdrive) - (£11.00)

Check P.O. to:

ASKE BYRONCITIES, 183 Bristol Road, Birmingham B5 7JL

COMMODORE 64

This superb utility program will assist CBM owners to transfer their software from cassette to disk.

Supplied on cassette with full instructions.

Send £4.99 or SAE to:

Clark Kent Software

26, Northcote Walk, CORBY

Northamptonshire NN18 9QQ

SPECTRUM SPEEDYLOAD. Halve your waiting time! This short program lets you save/load at 3,000 baud. Easy to use with any tape command, cassette (48k) £3.95 Neas Micro Systems, 100 Drakies Avenue, Inverness.

DRAGONAID

A must for all Dragon owners. Full of useful information, peeks and pokes. Make your programs unlistable on-storable etc. Also includes many machine code utilities including Keybeep, Auturon Easymerge plus much more!

DRAGONAID IS AVAILABLE NOW AND

IS ONLY £2.00

including postage from:

JOHN BUCKLEY 31 COPPER HOUSE

KERSAL, SALFORD LANC'S M70RU

SOFTWARE

MAKE MONEY with your microcomputer. Helping companies, doctors, architects, etc. SAE free information folder. C.D.S. Marketing, (PCI), Bishopsbriggs, Glasgow, G64 1BR.

AQUARIUS (unexpanded) can play

real music. Full instructions, listings, demo cassette. £6. From: Edwards, 38 St. Stephens Close, London, E17.

COMMODORE 64 software to swap or sell. Including many titles. Contact A Gerard B.P. 116 Lige X Belgique.

SPECTRUM CASH PLANNER

Monthly or block entries of up to 8 expense categories and 3 income categories.

Expense categories user definable.

MICRODRIVE option included.

Very user friendly - tape £4.00

also VU file conversion to MICRODRIVE

Instruction sheet £1.50

RELIESOFT

9 BEECHLANDS PARK, SEABILL

HOLLYWOOD, CO DOWN, BT18 0DR

MAKE MONEY. Sell computer games, no capital outlay. Details from C. G. Computers, 42A Briercliffe Road, Burnley, Lancs. BB10 1XB. Tel: 0282 596003.

HOME ACCOUNTS. Put your home in order! Probably home computers best use! Comprehensive coverage of bank accounts, credit cards, HP. Inbuilt accuracy check. Records all transactions.

Protects cashflow for any period ahead. Available for CBM64 or Vic 20.

£7.50 or free details from R. B. Computer Services (Dept CA), 2 Hazelwood, Windmill Hill, Brotham, Devon.

Tel 080 45-55532.

BBC MODEL-B OWNERS. Are you

interested in receiving free software?

ring Chris (0332) 515454 evenings

after 7.30pm and weekends

CLUBS

Vic-20 Software Hire

100 titles from 50p per week.

Free Membership

SAE for your membership kit to:

VSH (PCW), 242 Ramsom Road,

Mapperton, Nottingham.

SPECTRUM/ORIC/ATMOS software library. Fast service, very latest tapes. SAE for details. Hire-soft 113 Broomfield Road, Marsh, Wolverhampton.

SPECTRUM LIBRARY free hire two tapes two weeks hire £1.00. Send £4.00

file membership 'Softypost' to Stratton Street, Wolverhampton.

BBC DRAGON SOFTWARE LIBRARY

Why buy tapes when you can hire up to 7

for the same price. Membership fee £3

Tapes £1 + 230 p&p Catalogue

growing. Write: E. Tisdler,

4 Springfield Estate,

Grimston Rd, 9th Wootton,

King's Lynn, Norfolk.

SOFTOPTON The Spectrum software

swapshop. Cassettes exchanged for

just £1.00. Send SAE, Softopton, 8

Wyre Street, Ashton, Preston, Lancs.

PR2 2RQ.

EDUCATIONAL SOFTWARE

EDUCATIONAL SOFTWARE for 48K

Spectrum GCE, O/CSE physics 6

programs £6.50. Chemistry 6 programs

£6.50; or both tapes £12. Thinktank, 35

Wellington Road, Wimbledon Park,

London SW19 8EQ.

ANIMATED MUSICAL Flashcard and

spelling program for CBM 64 developed

in collaboration with school and educational

psychologist. Suitable 1½-7

years. Cassette £4.50. Disc £7. From:

Toddlersoft, 1 Gallane, Ewelme, Oxon

OX9 6HX.

48K SPECTRUM owners 'O-Level

G.C.E., C.S.E., maths test gives your

children private tuition for only £3.99.

Nurssoft (Dept P.C.W.) 95 Garton Rd,

Northolt, Mddx, UB5 4ST.

ACCESSORIES

BBC

VOLUME CONTROL.

At last variable sound control

UP/DOWN or OFF.

Instructions and kit £2.80

inclusive.

Other machines SAE details

RACEY DESIGNS

47, Twycross Rd,

Burbage, Leics LE10 2S

BLANK CASSETTES

£10 length £3.65 for 10

£28 for 100 inc. p&p

fully guaranteed.

UK Home Computers

62 Churchward Avenue, Swindon, Wilt

DUPLICATE COVERS

Protect your investment.

We produce made to measure

top quality dust covers. Printers, disc

drives, keyboards £4.50, VDU £5.50.

Colours olive or navy. S & C Textiles,

4 Brookside, Diseworth, Derby. Tel.

0332 810099.

PROFESSIONAL CASSETTE CASES

Used by better software houses. Store your

programs in our 8" x 6" library cases. Cassette

and floppy holders match, clear extendi books.

Only £1.25 each, 10 for £10. Free postage. Cheque

PO to S.D.C., 9-10 Bacony Wilton, York

SPECTRUM TIMESAVER. No more

pulling out leads on save and load

£4.87. K Gibson, 44 Highlands Road,

Horsham, Sussex. RH13 5LU

I/O for your Spectrum, 4 port 64 bit.

Price £49.95. For details please send

SAE to Future Electronic services, 55

Eastcote Avenue, South Harrow,

Middx.

SERVICES

ZX81 & SPECTRUM REPAIRS

AND ON SPECIALISTS

MOST COMPUTER COMPONENTS

SPECTRUM REPAIRS £15

● 24 Hour postal service or

While You Wait

● Keyboard with speaker -

£46.00

● Open 9 a.m. to 8 p.m. Mon-Sat

MANCAMP LTD

Frankfurt, Kent, Faversham

Manchester, M19 3JP

Tel: 081-224-1000

DATA DUPLICATION

M.G. Copies, Burnwood Walsall

West Midlands WST 0ES

High speed dedicated data duplication,

printing if required. Prices from 28,

57p (C15) per cassette incl library case

Write for your full price list of

telephone Burnwood 75375-124 Hral

SINCLAIR REPAIRS. Fast reliable service

by qualified engineers. Prices include

p&p. Spectrum £15, ZX81 £12.

Cheque or PO to RA Electronics, 50

Kimberley Road, Lowestoft, Suffolk

NR33 0TZ. Tel 0502 66289.

MICRO-SERV

The home computer repair specialist

in Scotland

BBC, SPECTRUM, VIC 20 AND

ALL PERIPHERALS. 3 MONTH

WARRANTY ON ALL REPAIRS

UNIT 4, Denny Workspace,

Denny, Scotland, FK6 6DW.

Tel: Denny (0324) 823468

REPAIRS - ZX81 - SPECTRUM

out-of-guarantee repairs by our computer

dept. Engineers have had three

years experience servicing Sinclair

computer products. Price including p&p

ZX81 - £11.50; 16K Ram - £9.95;

Spectrum - £18.75. Send with cheque

or P.O. III: TV service of Cambridge

Ltd., French's Road, Cambridge CB3

3NP. Tel: (0223) 311371.

IMPORTANT! Have you written a program but don't know how to sell it? Top software houses listen to us, so let us try to sell them your programs? For professional advice, copyright registration, critical appraisal and a better chance of success send S.A.E. for full details to B.C.M. Topsoft, London WC1N 3XX.

ZX SPECTRUM Epron programming service. Send 2764/27128 Epron, Commodore on tape and £6.00. Alan Turnbull, 65 Vicarage Road Stockport, SK3 8HL.

SPECTRUM REPAIRS. £14 including

parts p&p etc. ZX81 £11. Rampack £10.

Fast reliable service by qualified

computer engineers. 0772 643897.

SEE Simon Stable's special spring

duplication offer! C1-C15 from only 28p.

Write or phone him today 086925

2831

DUPLICATION

CASSETTE duplication services for computer cassette copying, highest quality, fast turnaround. Giveaway prices. We are the best! Tel: C.D.S.

(021) 557 4841 (1pm-3pm 11pm-10pm).

the records

COMPUTER PROGRAMS

REAL TIME or Slow HIGH SPEED Professional

Cassette Duplication and Blanks from

1 to 1,000+ Computer printed Cassette

Labels, etc Fast Security Delivery service

the records - a division of FILTERBOND

LTD, 19 Sadlers Way, Harford SG14 2DE.

0832 - 541188

Dear Reader my name is Simon Stable I

specialise in real-time data duplication for

most cassette based micros. Disc copying for

BBC 48K (injection available) (in order

printed labels, blank blank cassettes

PRINT

0869 252831 COMPUTER

PC, PERIPHERAL, 46 WESTERN, LONDON, ENGLAND

COURSES

HOLIDAY COURSES

FOR CHILDREN

NOW BOOKING

(£45 for 5 mornings)

(Adult courses as usual)

Fing: Computer Workshop

on 01-318 5488.

4, Lee High Road,

Lewisham, London SE13 5LO

THIS SPACE

FOR SALE

£15

TELEPHONE:

PCW CLASSIFIED

01-437 4343 Ext 206

FOR HIRE

COMPUTER VID. Unique rent a tape

service from £1 a week. If you like the

game we take a rental fee off the cost

of the game. £5 life membership. Available

for popular computers. Write to:

278A Wightman Road, Hove, Sussex N8.

Tel: 340 4074.

HIRE A COMPUTER from ZX81 up-

wards for a week or a year. We also buy

and sell second-hand computers,

magazines and books. Business and

JOIN THE SUCCESS STORY

A major International publishing group is looking for high quality software. If you have developed programs for the best-selling micros and want them published worldwide by a prestigious and reliable organisation, join the success story - contact us now.

MACMILLAN SOFTWARE

Get in touch with: **Tony Feldman**
Macmillan Publishing Group
4, Little Essex Street
London WC2R 3LF
01-836 6633



WINDSCREEN MOTIFS



BOOKS

BODY — POPPING, break dancing. All styles of disco. Teach yourself. SAE for details. Dance Publications, 136 Monkhill Lane, Pontefract WF8 1RT.

MAGAZINES



DRAGON USER

To make the most of your Dragon you need **Dragon User** — the independent magazine for Dragon owners. To make sure that you receive a copy of Dragon User regularly subscribe direct to us. A year's subscription costs £10 for 12 issues (overseas rates available on application). Send a cheque or postal order made payable to Dragon User, and accompanied by your name and address, to: Dragon User, Subscription Department, Oakfield House, Putney Mount Road, Raywards Heath, Sussex RH16 3DH.

WANTED

AGENTS, free lance required, to sell home computer software: (1) London

and south of England, (2) Scotland and north of England, apply in writing to: 'Dollarsoft' 3, Everard Glade, Bradway, Sheffield S17 4NG.

WANTED:

Software for Spectrum 48K, Commodore 64 and VIC20, and Atari.

Also, Spectrum 16K/48K and Commodore 64 computers wanted.

Newell Data Service,
114 Fortress Road,
London NW5 2HL
Tel: 01-267 9037

**SINCLAIR Q.L.
WANTED
PREMIUM PRICE
PAID
CONTACT TREVOR ON
(0892) 39606 (DAY)**

PUBLISHER WANTED
A self-employed computer science graduate is writing **GAMES AND UTILITY** programs for popular micros. He **URGENTLY** requires a publisher to publish and market his software products. Cash offer for each program will also be considered. For details contact: Mr Farhang-Mehr, on 01-354 1584

**WANTED
YOUR SOFTWARE**
WHITESOFT will pay top royalties for good software for VIC 20, C64 64 and SPECTRUM. We want original games, arcade and adventure, utilities and educational programs. Send your programs, or for more information, contact: **WHITESOFT**
OLD MILL FARM
BLACKWATER,
NEWPORT,
Isle of Wight
Tel: 0983 528763

**WILL PAY UP TO
£225 FOR BBC B
£136 FOR COMMODORE 64
£86 FOR ZX SPECTRUM 48K
£100 FOR DRAGON 64K
£100 FOR ATARI 800 XL 64K
TEL: 01 435 8538**

WANTED

ECCE PRODUCTIONS

are expanding their software list. We urgently need good and original software for the BBC Micro and Spectrum. We are mainly looking for utilities and business programmes but we will consider good games programmes. Highest royalties available so send your software to:

Stuart McKear,
ECCE Productions,
3/73, Station Road,
Sidcup,
Kent
DA15 7DR
01 302 1067

SUNSHINE

are seeking authors for new titles to add to their highly original and successful book range. Experienced and full-time authors are invited to submit manuscripts. For full details of our requirements from David Lawrence, Book Editor, Sunshine, 88-13 Little Newport Street, London WC2R 3LD

Sunshine Publishers of Official Computing and Dragon User

HARDWARE

SPECTRUM 48K
with Interface 2
£125.00
COMMODORE 64
with C2N Cassette
£202.50
ORIC 48K
135 games from £1.90
Instant credit available
NEWELL DATA SERVICE
114 Fortress Road, London
NW5 2HL. Tel: 01-267 9037

Replica Glock
Firing Bolt 45
Automatic. As used by US army,
ideal stage prop with ammo £3.25
Carriage 50p

Replica M1 Auto
Magnum,
the gangsters favourite with
ammo £4.35 Carriage 50p

Colt Python 357.
As used by police and
screen heroes
With ammo £4.40,
Carriage 50p

Ideal for video film making. Mail order only.
Send cheque or PO to: Paul Matz, 80
Saltburn New Road, London SE25

COMPUTER SWAP

Computer Swap entries are limited to 30 words. Either fill in the accompanying form and send to Computer Swap, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2R 3LD or telephone 01-437 4343.

All software offered through computer swap must be in original condition and for private sale only.

Warning: It is illegal to advertise pirated software.

COMPUTER SWAP

Please write your copy in capital letters on the lines below.

Name.....

Address.....

Telephone.....

FOR SALE

COMMODORE 64, cassette, Arrow & Simons Basic Programmers Guide. Various books. Commodore 801 printer, all few months old. Exchange Osborne with printer. Tel 01-539-1844 8.30am to 5pm

COMMODORE PRINTER MPS 801. Hardly used, ten months guarantee. Ideal first printer, some paper included. £195 onco. High Wycombe 35240
VIC 20 + CASSETTE unit, 16K switchable Ram pack, cassette games, 4 cartridges, books and magazines. Quick sale, £175 onco, also VIC1525 printer inc paper £185 onco or all for £330 Everything boxed! Tel (0642) 564368

COMMODORE 64 business software + games on disc to exchange or sell. Phone 0827 53922. Also wanted, business programs to buy

SPECTRUM 48K with microdrive, printer, micronet attachments + many tapes mags, books, excellent value £200 Phone 01-402 9537 after 7pm
COMMODORE VIC 20 (with box) £75, 8K 3 slot Motherboard £30, Programmer's aid £20, 10 cartridges £3 each, 26 original cassettes £3 each, Soft Switch £10. For details phone Eddie 0442 833820

TANDY TRS 80 computer 64K disc drive VisiCalc, word processor Many books Suit enthusiasts or businessman working from home. £445 onco Crowborough B1252 evenings

VIC 20 C2N joystick 16K Ram. Over £170 Software 17 cassettes 4 cartridges maths level revision tape. Books and magazines etc onco Tel Leeds (0532) 756637 any time

BBC MODEL B, manuals, software, books, magazines £300 Tel: 0422 44036

Computer Swap 01-437 4343

Free readers entries to buy or sell a computer.
Ring 01-437 4343 and give us the details.

For sale

SHARP PC1211 pocket computer plus cassette interface and printer £40 00 01-550 8965 Mr Goodwin after 7pm
FOR SALE an untouched Androids tape only £1 first come, first served, send money to — Church Farm House, Bredfield, Woodbridge, Suffolk, IP13 6AX, my name is James Giller

ELECTRON SOFTWARE for sale Twin Kingdom Valley Missile Control, Mined-Out Cybertron, Moonbase Alpha, Birds Prey All £6.00 S.A.E. and cheque PO to S.N. Nank House 80, Room 4, Manchester M6 6DB

FOR SALE Sharp M280K with Basic plus Basic extensions and assembly language Manuals and textbooks £280 onco Tel Birmingham (021) 355 1908

FOR SALE, my collection of 130 games programs (listings) for the Spectrum £7 50 Tel Stevenage (0438) 811634 evenings.

ORIC 48K 6 months old — £100 of s/w 2 program books £175 onco. Tel Orpington 29067 anytime

PRISAL DTX 500 (modern) Spectrum £75 Tel. 01 961 4255.
SHARP M280A 48K assembler disassembler Basics + games. Hardly used £325 for quick sale Tel Gooles 861364.

Diary

Event	Venue	Dates	Admission	Organisers
Apple 84	Fulcrum Centre Slough	May 24-25 10 30am-5.30pm May 26 10 30am-4 30pm	£2.00 on door (free tickets in advance from organisers)	Database Publications, 66 Chester Road, Hazel Grove, Stockport 061-456 8363
North Wales Computer Fair	Memorial Hall Boddyhyd Wrexham	May 26 10 00am-4.00pm	50p adults 25p children £1.00 family ticket	Wrexham & District Computer Club
Cetex (Consumer Electronics Trade Exhibition) (Trade only)	Earls Court	May 27-30 10 00am-7 00pm	Free	Montbuid Ltd 11 Manchester Sq London W1 01-466 1851
Software 84 (Trade only)	Earls Court London SW5	June 5-7 10 00am-6.00pm	£2.00 on door (free tickets in advance)	Reed Exhibitions Surrey House Throwley Way Sutton Surrey 01-643 8040
5th International Commodore Computer Show	Novotel Hammersmith, London	June 7-8 10 00am-6 00pm June 9 9 00am-5 00pm	£2.00 adults £1.00 children £3.00 family ticket	Granard Communications, 4 Babmaes St, London SW1 01-930 6711
The Computer Fair	Hall D Earls Court London	June 10 10 00am-6 00pm (trade and press only) June 16-16 10 00am-6 00pm June 17 10 00am-5 00pm	£3.00 adults £2.00 children & OAPs	Reed Exhibitions, Surrey House, Throwley Way, Sutton, Surrey 01-643 8040

TEXAS INSTRUMENTS 994A complete with colour monitor cassette recorder £200 of T1 module s/w inc: Extended Basic, new £450 + will sell for £200 00 Tel: 061 301 2518 (day) 061 797 4702 (even) (Mr Clynes)

Sharp PC1251 + C125 cassette printer Interface £95 onco. Tel (0257) 481 705
EDTASM - assembler cartridge for Tandy colour computer 11 months old Includes user guide £25 Coatl £40 Telephone (0632) 781031 after 5pm Bolton 28291 after 5.30pm

PRISM VTX 5000 modem for Spectrum Little used £70 Tel 0920 2623 (Ware)

FOR SALE 20 top selling 16 and 48K games for the Spectrum Top names like Ultimate, Protek, Imagine Melbourne Quicksilver and many more Worth £125 sell for £65 Studley 3720
NASCOM 1, 48K Ram 16K Eprom board 8K Basic, extended Basic tape enhanced Basic tape Nascom mags software — Keys of Kraal Backgammon etc in steel case. Tel Chippingham 657861

FOR SALE, solutions to Scott Adams Adventure cartridges £1. Send money to Martin Wright, Alma, Cilcennin Lampeter Dyfed Wales SA46 8RH with name, address and solution required Tel 0570 470362

STONKERS Mr Wimpy Jumbly Death Chase, Pinball Wizard, Thrusta Speed Dual, River Rescue, Brain Damage, Rommel's Revenge, Frax, Push Off etc for sale Phone 061 681 3651 Tony

CB FIDELITY 2000 and all accessories Sell for £50. Or will swap for hardware for CBM 64, and games will pay for originals Tel: 01-958 8643

ORIC 48K CASSETTES for sale. Chess, Zodiac, One Flight, £3 each or 3 for £8, 4 Lorraine House, Acce Lane, Wallington, Surrey SM6 7NX.

25,000 *HUSTLER PLAYERS CAN'T BE WRONG!!

Don't miss the full range of magical programs for your Commodore

Available from:
W H SMITH, LASKYS, LIGHTNING DEALERS, SPECTRUM SHOPS, GREENS, HMV SHOPS, GAMES WORKSHOPS, CENTRESOFT and PCS STOCKISTS and all Good Dealers

*HUSTLER is a realistic Pool simulation.

or direct from



bubble bus software

87 High Street, Tonbridge, Kent TN9 1RX
Telephone: 0732 355962

HOME COMPUTER CENTRE

HUGE SELECTION OF GAMES, BUSINESS AND EDUCATIONAL SOFTWARE, AND ACCESSORIES. FOR: SPECTRUM, BBC, DRAGON, VIC 20, COMMODORE 64 MACHINES, JOYSTICKS, TAPE RECORDERS, INTERFACES AND COVERS. SERVICE AND REPAIRS. (MAIL ORDER OR CALL IN), SELECTION OF BOOKS, KEYBOARDS, LEADS.

SAE FOR LIST

Largest selection in N. London

ENFIELD COMMUNICATIONS

135 HIGH STREET, PONDER'S END, ENFIELD, MDDX.

Tel: 01-805 7772



TITANIC

The Adventure Begins...

With Currah Micro Speech

FREE on Side 2
4 mini-epic in high energy rock
TITANIC (The music)



FOR 48K SPECTRUM

R&R Software Ltd, 5 Russell Street, Gloucester GL1 1NE. Tel: 0452 502819

NOW AVAILABLE
ONLY £7.95

SPECIAL OFFER

VIC 20 starter pack £139 inc.

(subject to availability)

CBM 64 £185 inc.

QUICKSHOT II JOYSTICK £9.50

limited offer

SPECTRUM UPGRADE (16K to 48K) £29 fitted

WIDE RANGE OF SOFTWARE, BOOKS, JOYSTICKS — ALSO
FAST REPAIR SERVICE FOR MOST POPULAR COMPUTERS.

SOFT TOUCH OF LONDON

12 DARTMOUTH PARK HILL

LONDON NW5

TEL: 01-263 3842

THE SOFTWARE LENDING AND EXCHANGE LIBRARY
SPECTRUM, COMMODORE 64, DRAGON, VIC 20, BBC & ZX81

YES! We have programs for your computer.

We hire programs from 50p. (ZX81). Two weeks.

£5.00 LIFE MEMBERSHIP (Less than the cost of a single game)
brings you our membership kit, including hire listings, software
exchange catalogue and introductory letter.

We now have OVER 300 HIRE TITLES, and 500 EXCHANGE
TITLES, with large Spectrum and Commodore sections.
All mail dealt with on a daily basis and OVERSEAS MEMBERS
VERY WELCOME

New software discounted to our members at impressive rates.

Send cheque/PO for 5.00 to:

The Software Lending Library,
PO Box 3, CASTLEFORD,
WEST YORKSHIRE. WF10 1UX

Stating name, address and computer type.

FORGET THE REST AND JOIN THE BEST!



SOFTWARE

MAIL ORDER ONLY

FREE DELIVERY ON ALL SOFTWARE

BBC

	RSP	Our Price
Chuckle Egg (A&F)	7.95	6.95
747 (Doctor Soft)	8.95	6.95
Legion (S Projects)	7.95	6.95
Killer Gorilla (M Power)	7.95	6.95
Penguin (Postern)	6.95	6.95

CBM 64

	RSP	Our Price
Mania Miner (S Projects)	7.95	6.95
Nunchuck (Ocean)	6.95	6.75
Mr Wimpy (Ocean)	6.95	6.75
Ugh! (Softex)	7.95	6.95
Bugaboo (Quicksave)	6.95	5.95

SPECTRUM

	RSP	Our Price
Jet Set Willy (S Projects)	5.95	4.70
H.U.R.G. (Melbourne)	14.95	11.95
Sherlock Holmes (Melbourne)	14.95	11.95
Lunar Jetman (Urmale)	5.50	4.45
Munchback (Ocean)	6.95	6.45

DRAGON

	RSP	Our Price
Up Periscope (Beyond)	6.95	6.75
Dragon Chess (Ocean)	5.95	5.45
Chuckle Egg (A&F)	7.95	6.95
Space Shuttle (Microdeal)	6.00	5.95
Devil Assault (Microdeal)	6.00	5.95

Send Cheque/PO to

N. A. SOFTWARE, PO Box 21, Worsley, MANCHESTER M20 6LS

For details of SPECIAL OFFERS and EXCELLENT DISCOUNTS on Software for BBC, CBM, Dragon, Spectrum, Electron, etc. Vic 20, ZX81 SAE for price lists. (State Micro)

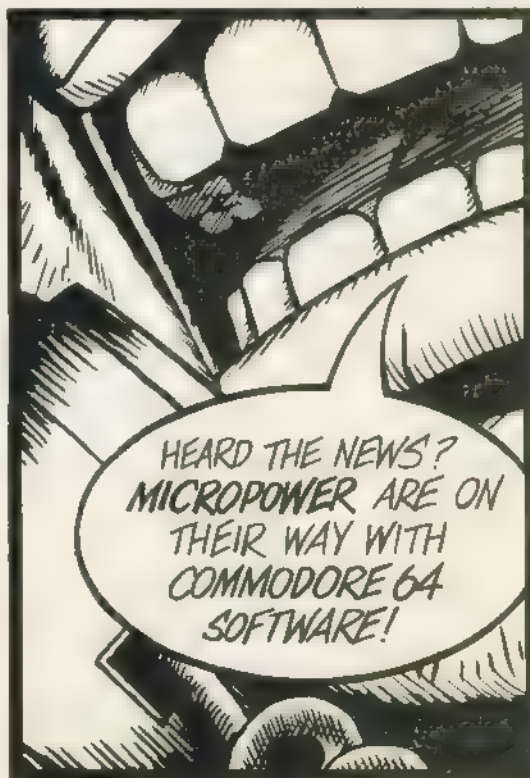
POPULAR COMPUTING WEEKLY — the top-selling weekly microcomputer magazine — is looking for a SOFTWARE EDITOR

Somebody bright and enthusiastic is needed who will help maintain the high standard of software coverage in the magazine — both in the listings we print and in the commercial packages reviewed.

Some editorial or production experience would be an advantage, as would a knowledge of programming. More important though is the ability to work within the tight schedules of a successful weekly paper.

Popular Computing Weekly is one of a number of titles produced by Sunshine — a rapidly expanding young publishing house based in Central London.

Applications in writing please to: David Kelly, News Editor, Popular Computing Weekly, 12/13 Little Newport Street, London WC2R 3LD.



PLAY ON

Buffer Micro is to be congratulated for releasing a program which is long overdue — a music utility that utilises the various add-on sound devices now available for the Spectrum.

These peripherals almost all use the same sound chip and consequently only minor alterations are needed to use the program with Fuller sound box, Zon, Zxm etc.

Make Music allows you to use all three channels provided by the sound chip to create and store tunes and play them using



the keyboard. I suspect that in many ways the facilities on this program do not do full justice to all that's possible with the sound add-ons but nevertheless, a most welcome release.

Program	Make Music
Price	£5.95
Micro	Spectrum (+sound add-on)
Supplier	Buffer Micro 310 Sreatham High Road London SW16 6HG

SUPERIOR

Some of the better Dragon games have come from J Morrison Micros — although *Mission XK1* worried me from the first time I set eyes on the instructions 'Landing on large pad 50 points, middle pad 100 points' etc etc — this could only mean one thing (chill wind of realisation blows through the

Popular citadel): *Lunar Lander!*

And *Lunar Lander* it proved to be, albeit with some extra features like a band of meteors that block the ascent and descent of the ship.

So along with the left a bit, right a bit on the retros, you blast away at meteors hoping that the fuel doesn't run out. Original it's not, but it is all in machine code and graphically it is much superior to most Dragon games.

Program	Mission XK1
Price	£6.95
Micro	Dragon
Supplier	J Morrison (Micros) 2 Glensdale Street Leeds LS9 9JJ

ABOVE AVERAGE

Cricket buffs and players can now keep records of Cricket information on *Cricket Averages* by South Coast software.

The program, which is basically a database, will store information on individual and team performance to be retrieved in a variety of ways — alphabetically, by scores, by catches, etc.

The program, which is apparently actually used by Vic Isaacs of Hampshire County Cricket club, can also be saved to Microdrive for quick updating.

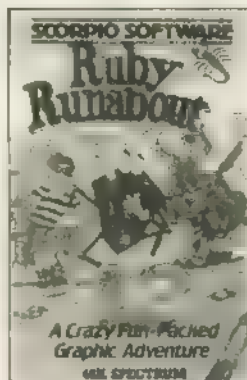
Program	Cricket Averages
Price	£4.95
Micro	Spectrum/BBC
Supplier	B/Electron South Coast 1 High Walk Fareham Hants PO15 6BS

IT'S A GEM

Ruby Runabout is a graphic adventure for the 48K Spectrum from a new company, Scorpio software.

It is not going to break any technical frontiers but is still pretty good fun in the *Knight's Quest* mould of difficult puzzles with neat little illustrations of some of the locations.

Less noble than some previous adventures, you are the appallingly named Reggie the



Ruby Robber and your quest objective is the steal the Rock-salmon Ruby and stash it away in your garage hideout.

There are forty locations to explore and the whole thing is fairly jokey although not easy to solve. The program can understand the usual range of verb noun combinations — probably good fun for novices.

Program	Ruby Runabout
Price	£6.95
Micro	Spectrum
Supplier	Scorpio Software 11 Fennel Street Manchester M4 3DU

BOUNCING

Jet Power Jack is a multi screen arcade game for the BBC from Program Power — one of the most highly respected houses in the BBC field.

Despite the name the game has little in common with the similar sounding *Ultimate game*. Jack (is Jet Power his Christian name?) has to refuel various waiting starships.

To get the requisite fuel pods he must cross various dangerous garages chock full of assorted nasty bouncing, jumping, lurking and zooming bad-dies.

There is a time limit in the form of Jack's dwindling oxygen supply and additional problems such as Jack's Turbo-pac which behaves somewhat erratically. Colourful and addictive, with great graphics.

Program	Jet Power Jack
---------	----------------

Price	£7.95
Micro	BBCB
Supplier	Micro Power Northwood House North Street Leeds LS7 2AA

SHUFFLER

Bridge programs are emerging from the woodwork — presumably because I said there weren't many of them a few weeks back. Oh well.

Contract Bridge is for the Atmos and seems to have the same features as other versions on the market — the computer bids, shuffles, deals and plays out its hand.

Program	Contract Bridge
Price	£5.00
Micro	Atmos
Supplier	Touchstone 61 Highfield Road Saxilby Lincoln

CABBAGES

Revenge of the Killer Tomatoes is an arcade game presumably inspired by the classic film *Attack of the Killer Tomatoes* which featured the amazing couplet: 'how I'm gonna miss her, a tomato ate my sister'.

The idea of the game is to avoid rows of cabbages and roving vegetables whilst trying to remove stray weeds. Colliding with cabbages merely loses you points but touching other vegetables results in instant destruction.

There are, inevitably for a Spectrum game, sprite



New Releases

graphics and even good sound effects and on the whole the game is quite fun — ridiculously simple though, and I would take the blurb on the back which says 32 on-screen sprites with a pinch of salt — most of them seem to be cabbages.

Program *Revenge of the Killer Tomatoes*
Price £5.95
Micro Spectrum
Supplier Visions
1 Felgate Mews
Stundland Street
London W6 9JT

COMMITMENT

Magra has been pretty angry for a long time now but at last her wrath can be engaged to the full — *The Wrath of Magra* has been released.

To call it Epic is not enough; for £14.95 you get 120K of program and around 200 pages of book, plus some game notes in a neat little booklet. The booklet opens with the classic

understatement 'hope you get many hours of enjoyment'. Hours? — We're talking about years here.

Wrath of Magra is going to need commitment; the 200 page book sets various scenes to the action and explains why it is that you, lone adventurer, must set out your vast journey to kill the witch Magra and release princess Edora from eternal incarceration.

After a few pages I found the sub Tolkien style of the book a bit trying but full marks to Carnell for trying to bring a sense of atmosphere to the game — an often unappreciated but important ingredient to adventures.

The game itself...well, something bad first — response times are slow and simple commands take ages to be acted out — as I say you'll need commitment not to start throwing things at the computer.

On the other hand playing Magra is like playing almost every other adventure at once; not only are there amazingly difficult conundrums and puzzles,

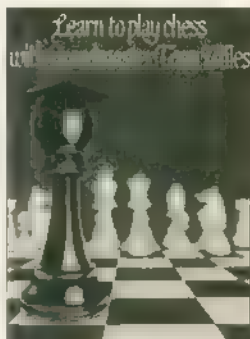
but there are illustrations of every location, complex sentence analysis, a large vocabulary, various considerations affecting your combat, ability to cast spells, tiredness, hunger etc etc.

Some sections feature hi-res monsters others enable you to buy and sell goods, sometimes you will need a map, mostly you will need a lot of help. If, generally speaking, you like Tolkien, Dungeons and Dragons, hard text adventures and marijuana you will go gaga over the *Wrath of Magra* — the rest of us will think it's pretty good too.

Program *The Wrath of Magra*
Price £12.50
Micro Spectrum
Supplier Carnell Software
North Weylands
Industrial Estate
Molesey Road
Hersham
Surrey KT12 3PL

IN DEPTH

Chess Master is a suite of programs designed to teach you Chess. Although Sinclair themselves have published something similar this is an



altogether more substantial package.

Chess Master consists of one program tape containing a variety of Chess positions and two Commentary tapes in which Chess Grandmaster Tony Miles talks you over what moves you should make and why.

The discussions are fairly detailed with the roles of the main fighting pieces analysed in great depth. It's a bit cumbersome having to switch about from commentary tapes to program tapes and vice versa but if you are a chess novice and you stick with it, I think this package could be very useful indeed.

Program *Chessmaster*
Price £15.95
Micro Spectrum
Supplier Serin Software
PO Box 163
Slough
SL2 3YV

IN THE GROTO

One consonant does not a different game make and whichever way you look at it, *Skramble* is *Skramble*.

Skramble was a very popular arcade game in which you piloted a ship through ever narrowing caverns past a variety of baddies through to an enemy base dozens of screens and thousands of failed attempts later. *Skramble* is exactly the same and is for the Commodore 64.

However, the game has the great virtue of being a very addictive concept to begin with, and by adding Commodore 64 graphics and sound to it you can hardly go wrong. Credit too, for selling the program at £5.99 which is at least a pound cheaper than the norm for such Commodore programs.

Program *Skramble*
Price £5.99
Micro Commodore 64
Supplier Rabbit Software
The Warren
Unit 11
Forward Drive
Wealdstone
Middlesex HA3 8NU

Pick of the week

WILD AND WOOLLY

A new Llamasoft game can always be sure of an extensive evaluation in the PCW office and *Sheep in Space*, for the Commodore 64 had a longer evaluation than most.

The objective of the game is to defend the planet (using a flying sheep) against various energy stealing aliens. The baddies can obliterate the planet by building up charge on the giant planet busters. Should a planet get destroyed then the sheep must venture out into space and kill off baddies in vengeance.

The sheep is equipped (aside from the ability to fly) with glowing bonios which wipe out all they come into contact with. Problems occur because the screen features two grounds — one at the top of the screen and another at the bottom — thus two separate gravities work on your bonios pulling them both upwards and downwards depending on where you are (if you see what I mean).

From time to time, the sheep

will get hungry and will need to graze this involves landing it on a green field — have you ever tried to land a sheep? Obviously it's wonderful — any game with flying sheep in it would have to be.



Program *Sheep in Space*
Price £7.50
Micro Commodore 64
Supplier Llamasoft
49 Mount Pleasant
Hants RG26 6BN

BBC*

- 1 (1) Aviator (Acomsoft)
- 2 (2) Spooks and Spiders (Software Invasion)
- 3 (3) Snooter (Visions)
- 4 (4) Battle Tank (Superior)
- 5 (5) Fortress (Allegato)
- 6 (6) Blagger (Addictive Games)
- 7 (7) Football Manager (Acomsoft)
- 8 (8) Fort (Acomsoft)
- 9 (9) JCB Digger (Acomsoft)
- 10 (10) French (Acomsoft)

*All model B
(Figures compiled by Micro Management, Ipswich (0473) 59181)

Vic 20

- 1 (-) Wizard and the Princess (Melbourne House)
- 2 (2) Submarine Commander (Thom EMI)
- 3 (-) Duckshoot (Mastertronic)
- 4 (7) Snooter (Visions)
- 5 (6) Tower of Evil (Thom-EMI)
- 6 (4) Tank Commander (Thom-EMI)
- 7 (1) Crazy Kong (Interceptor)
- 8 (3) Magiestic Llamas (Lamasoft)
- 9 (5) Jet Pac (Ultimate)
- 10 (10) Mine Madness (Thom-EMI)

Figures compiled by Boots/Websters

Commodore 64

- 1 (1) Magic Miner (Software Projects)
- 2 (-) Practicle (Marketing Micro)
- 3 (-) Inventory 64 (Marketing Micro)
- 4 (-) Practicle (Marketing Micro)
- 5 (6) Space Pilot (Analog)
- 6 (6) Black Hawk (Thom-EMI)
- 7 (-) BMX Racers (Mastertronic)
- 8 (5) Pedro (Imagine)
- 9 (-) Space Walk (Mastertronic)
- 10 (-) Practicle (Marketing Micro)

*Disc
Figures compiled by Boots/Websters

Dragon

- 1 (-) Chuckle Egg (A&F)
- 2 (-) Hungry Horse (Melbourne House)
- 3 (-) Enigma (Microdeal)
- 4 (3) Ugh! (Softalc)
- 5 (9) Up Periscope! (Bayard)
- 6 (9) Pedro (Imagine)
- 7 (2) Knapigapier (Bayard)
- 8 (-) Frogger (Microdeal)
- 9 (7) Space Shuttle Simulator (Microdeal)
- 10 (-) Cuthbert in Space (Microdeal)

Figures compiled by Boots/Webster

Spectrum*

- 1 (2) Jet Set Willy (Software Projects)
- 2 (1) Airc Attack (Ultimate)
- 3 (3) Chocorated Flag (Pison)
- 4 (5) Hunchback (Cosmo)
- 5 (8) Flight Simulation (Pison)
- 6 (4) Scuba Dive (Durrell)
- 7 (7) Pogo (Cosmo)
- 8 (9) Cyrus IS Chess (Intelligence)
- 9 (8) Lunar Jetmen (Ultimate)
- 10 (-) Alchemest (Imagine)

*All 48K except where noted. † 16K.
(Figures compiled by WH Smith and Son, London)

Atari

- 1 (1) Solo Flight (Microprose)†
- 2 (7) Rally Speedway (Adventure International)
- 3 (6) Zaxxon (Datasoft)
- 4 (3) Warlock (Calisto)
- 5 (-) O'Reilly's Mine (Datasoft)
- 6 (-) Earthquake 1906 (Adventure International)
- 7 (5) Pooyan (Datasoft)
- 8 (-) Stinky (Cosmo)
- 9 (-) Caverna of Karkia (Cosmo)
- 10 (-) Artai (Calisto)

*Cartridge 132K cassette
(Figures compiled by Calisto Computers, Birmingham 021 532 0458)

ZX81*

- 1 (1) Crazy Kong (PSS)
- 2 (-) Fantasy Games (Pison)
- 3 (3) Mothership (Softsync)
- 4 (2) Flight Simulation (Pison)
- 5 (2) Scramble (Quicksave)
- 6 (4) Chess (Pison)
- 7 (-) 1K Chess (Artic)†
- 8 (5) Space Raiders (Pison)
- 9 (8) Defender (Quicksave)
- 10 (-) Black Crystal (Carnell)
- 10 (-) Invaders (Quicksave)
- 10 (-) Vu-file (Pison)

*All 16K except where indicated
These titles tied for 10th position
Figures compiled by Boots/Websters

Books

- 1 (-) Spectrum Hardware Manual, Dickens (Melbourne House)
- 2 (-) 60 Games and Applications for the ZX Spectrum, Harwood (Interface)
- 3 (-) Spectrum ROM Disassembly, Logan (Melbourne House)
- 4 (-) Spectrum Machine Code, Stewart and Jones (Shive)
- 5 (2) Commodore 64 Games Book, Bishop (Granade)
- 6 (1) Creepy Computer Games, Erskine et al. (Osborne)
- 7 (-) 100 Programs for the Spectrum, McClean and Gordon (Prenice Hall)
- 8 (-) 60 Programs for the Sinclair Spectrum, Erskine et al. (Pan)
- 9 (10) 60 Programs for the Vic 20, Erskine et al. (Pan)
- 10 (-) Spectrum Book of Games, James and Gee (Granade)

Figures compiled by Bookwise

MAGIC

A neat looking book for younger children is *Spectrum Magic* from Foulsham. It is intended for the complete beginner starting off with leads and where to plug them and moving step by step to fairly full basic programming.

The book is well designed with clear pictures and diagrams and large unequivocal type. For really basic information I think it is one of the best such books I have seen.

Book	<i>Spectrum Magic</i>
Price	£4.95
Micro	<i>Spectrum</i>
Supplier	W Foulsham & Co Yeovil Road Slough Berkshire SL1 4JH

HAUNTED

Write your own *Adventure Programs* is a glossy hardback book that retails for a mere £4.50. Like many similar books, it takes you through the main elements involved in Adventure writing by actually developing an adventure called *Haunted House*.

The listings for the adventure are annotated so that the adventure can be run on any

popular micro and whilst the whole thing may not appeal to more earnest adventurers, kids will love it.

Book	Write your own <i>Adventures</i>
Price	£4.50
Micro	<i>General</i>
Supplier	Usborne Publishing 20 Garrick Street London WC2E 9BJ

COMMANDS

In the same way that there are quite a few people who bought books on the Spectrum Microdrive without having seen one, so some people will be interested in the *IBM PCjr Buyer and User Guide*.

It's actually a very good book detailing the peripherals, commands, keyboard, interfacing, use of disc drive, Basic, publications, etc, for the IBM machine. It's the kind of information that is very useful to have all in one place and it could actually be worth buying even if you are only (when it becomes available) thinking of buying the Jr.

Book	<i>IBM PCjr Buyer and User Guide</i>
Price	£8.95
Micro	<i>IBM PCjr</i>
Supplier	Prenice/Hall 66 Wood Lane End Hemel Hempstead Herts HP2 4RG

This Week

Programme	Type	Micro	Price	Supplier
Staircase Stampede	Arc	BBC	£7.50	Comsoft
Castle Assault	Arc	BBC B	£5.70	MRM
Childs Play	Ed	BBC B	£6.95	Dial
Childsplay	Ed	BBC B	£9.95	Polarsoft
Daria	Arc	BBC B	£5.70	MRM
Monsters & Magic	Arc	BBC B	£5.95	ISP
Scrabble	Arc	BBC B	£5.70	MRM
Spellwell	Ed	BBC B	£5.95	Bial
Attack on Windscale	Ad	Commodore 64	£9.95	Phoenix
Bath Time	Arc	Commodore 64	£7.85	PSS
House of Asher	Arc	Commodore 64	£8.95	Anirog
Ice Hunter	Arc	Commodore 64	£8.95	Anirog
Patch	Arc	Commodore 64	£8.95	Anirog
Pinball Wizard	Arc	Commodore 64	£8.95	CP
Spider and the Fly	Arc	Commodore 64	£7.00	Interceptor
The Electron Game	S	Commodore 64	£1.99	Mastertronic
Waltie goes to Rhymeland	Ed	Commodore 64	£7.00	Interceptor
Chemistry Test One	Ed	Dragon	£1.80	P.A. Peris
Chess II	S	Oric	£9.99	Tarsoft
Airbase Invaders	Arc	Spectrum	£5.95	CP
Antics	Arc	Spectrum	£6.95	Bug Byte
Character Designer	Ut	Spectrum	£8.95	ISP
Computer Cook Book	Ut	Spectrum	£9.95	Bug Byte
Friendly Face	Ut	Spectrum	£6.95	Monitor

Hover + Panic	Arc	Spectrum	£6.00	Dollarsoft
Lords of Midnight	Ad	Spectrum	£9.99	Bayard
Manor of Madness	Spec	Spectrum	£5.95	Celtic
Message from Andromeda	Ad	Spectrum	£7.00	Interceptor
Multifile	Ill	Spectrum	£9.95	ISP
Operation Roman Gaul	Ad	Spectrum	£5.50	Specsoft
Screen Machine	Ad	Spectrum	£8.95	ISP
Spectrum Sprites	Ut	Spectrum	£7.95	ISP
Tank Attack	Arc	Spectrum	£1.99	Mastertronic
The Inferno	Ad	Spectrum	£6.50	Richard Shepherd
The Pit	Arc	Vic 20	£7.00	Interceptor
Climber	Arc	ZX81	£3.95	Unicom

Key: Ad — adventure/Arc — arcade/Ed — education/
S — strategy-simulation/Ut — utility

This Week is a new section that covers all the new software coming on to the home micro market each week. All suppliers should send details of their new programs to: This Week, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD.



What is Life?

I had a twinge of nostalgia when *Life* was mentioned again in a recent *Popular Computing Weekly*. Several national debts' worth of computer time must have been wasted by this "solitaire game", quite a bit of it by me — I still have smug memories of running it in Fortran at the Oxford University Nuclear Physics Dept and the Atomic Weapons Research Establishment, to name but two. Younger computer addicts, though, may be gaping blankly and asking the very philosophical question, "What is Life?"

It was invented in the late sixties by John Horton Conway, the celebrated Cambridge mathematician; the *Life* boom got under way when Martin Gardner made it the subject of a 1970 "Mathematical Games" column in *Scientific American*. More columns followed; and now at last the revised and expanded facts of *Life* are available in Gardner's latest excellent collection of his own columns, *Wheels, Life and Other Mathematical Amusements* is published by W. H. Freeman & Co at £13.95, contains 19 other pieces besides the three on *Life*, and is strongly recommended to seekers after truth. This publication puts an end to the need to ferret through dusty heaps of old magazines...

Life isn't a game in the usual sense; Conway himself has called it a no-player game. The idea is enticingly simple. You have a big two-dimensional array like an infinite chessboard; each square is called a cell, and touches eight others (if you don't believe me, get out your infinite chessboard and count). To begin with, each cell is either full or empty — the starting pattern is up to you. Then the rules of *Life* take over.

If a full cell has two or three full cells touching it, it survives to the next "generation". A full cell

dies from exposure if none or only one of the touching cells is full — it also dies from overcrowding if more than three of the touching cells are full. Either way, it becomes an empty cell for the next generation. Finally birth happens in an empty cell when it has exactly three full cells touching it, in which case (you guessed) the empty cell becomes full.

A nice example is a row of three full cells. In the next generation, the two end cells die of exposure, but at the same time there are two births on either side of the centre cell — a horizontal row of three becomes a vertical one. This pattern is called a blinker; it oscillates forever from horizontal to vertical and back again, as the generations go by.

Sounds trivial and boring? The interesting thing is that Conway's simple rules can generate bogglingly complex patterns from humble beginnings. Watching them change generation by generation on the computer display, you can see movement, evolution, even savage conflict. There are *Life* patterns which crawl about the array, or gobble other patterns with feral cries and revolting table manners. Gardner's book has a useful catalogue of the simpler *Life*-forms.

People who watch the movement and evolution of *Life* patterns can get funny ideas, such as that maybe the laws of our universe could at root be as simple and arbitrary as Conway's. Could a *Life* configuration be intelligent? SF author Piers Anthony had a go at this question in his (alas, not very good) book *OX*, to the confusion of readers not familiar with the game. Conway and others asked a less cosmic but more answerable question: could a *Life* pattern function as the next best thing to intelligence, ie a universal computer?

The answer is yes. A chapter in *Winning Ways* by Berlekamp, Conway and Guy (*Academic Press*; very expensive) shows how to construct a computer using the simplest moving *Life* patterns as bits: a computer capable of any mathematical task.

As a "thought experiment", this bursts the brain with the information that absolutely any mathematical problem can be reduced to the question of whether a particular *Life* pattern will or won't eventually vanish completely from the array.

So, next time you see someone gawping at peculiar patterns writhing and changing on their ZX81 monitor, do not scoff. It could just be a serious mathematical quest for the answer to *Life*, the universe and everything.

David Langford

That's my number!

Puzzle No 108

There was a great deal of celebration (including much bopping about) when the eleven members of the syndicate found that they had won just over a million dollars in the national lottery.

Naturally, there was extensive press coverage, with pictures of the group showering themselves with champagne and it was remarked that the sum on the cheque — in dollars and cents — contained no two digits alike.



Also, curiously, when the money was shared out equally there was an exact division.

How much was the total prize money?

Solution to Puzzle No 103

The program tests all possible four-digit numbers to see which has a reverse exactly four times as large. As this number has to be less than 833, only these numbers need to be tested.

```
10 FOR N = 1 TO 833:20 LET NS = STR$(N):30 IF N < 10 THEN LET NS = "000" + NS:40 IF N > 9 AND N < 100 THEN LET NS = "00" + NS:50 IF N > 99 AND N < 1000 THEN LET NS = "0" + NS:60 MS = "70 FOR F = 1 TO LEN(NS):70 MS = MID$(NS,F,1) + MS:80 NEXT F:90 IF VAL(NS) * 12 = VAL(MS) THEN PRINT NS,MS:110 NEXT N
```

This gives the only possible result: 0495 * 12 = 5940. Cyndy still has to remember which number goes with which lock, though.

Winner of Puzzle No 103

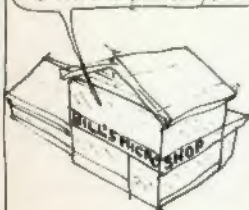
The winner is: Gary Henderson, Ambra Vale West, Clifton Wood, Bristol, who receives £10.

Rules

If the puzzle can be sensibly solved using a computer then the winner will have included a listing of the program used to find the correct answer. The closing date for entries to Puzzle No 108 is June 8.

The Hackers

This unit here has a first-rate teletext capability.



All the latest consumer news can be called up... so on, have a look!



Hey! Micro-Hut are selling this same unit at HALF your price!



AUTOMATA

... but seriously.

PIMANIA — the cult adventure that's for real!

16K ZX81 £5 ☐ BBC 32K £10 ☐ Dragon 32 £10 ☐ Spectrum 48K £10 ☐

GROUCHO - Competition closes June 1st.
Winner announced on this page July 4th!!

PI-EYED → the comedy cartoon arcade game, starring the PiMan. Free protest disco record.

Spectrum 48K €6 

PI-BALLED – A triumph of the arcade programmer's art.

Starting the Pitman. Free offensive Reggae music.

Spectrum 48K £6 ☐

MORRIS MEETS THE BIKERS — exciting arcade fun, as seen on TV. Outrageous free doo-wop record.

Any Supplemental CB ☐

YAKZEE - Buzzy wonderful game of ruck and skin.

An oriental masterpiece for

Dragon 32 plus Spectrum 48K ES

GO TO JAIL – Play the eagle

find out what all the fuss is about, cookie.

Spectrum 43K ES ☐

OLYMPIANISM — He's back! He's going for gold!

He's sober! Free National Anthem on the Upside.

Spectrum 48K ■ 

THE PIMAN'S GREATEST HITS — amazing stereo LP cassette

11

"I'M A PIMANIAC" - T Shirts (date size)

£5

JOIN THE PI MANIACS CLUB for 20% off all products, pi-monthly magazine etc. Annual Subscription £5 ☐ U.K. £7 ☐ overseas

☐ I ENCLOSE THE RIGHT MONEY, OR DEBIT MY ACCESS/VISA CARD

CARD NUMBER

MY SIGNATURE _____

NAME

MY ADDRESS

POST CODE

NO EXTRAS! ALL OUR PRICES INCLUDE DELIVERY AND V.A.T.

Send to **AUTOMAYA U.K. LTD.** 21 Highland Road, Portsmouth, Hants. PO4 9DA

24-HOUR CREDIT CARD HOTLINE (8706) 735242



